Ontario's Labour Market: Long term trends and issues in the 1990s

Ministry of
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EXECUTIVE SUMMARY

Economic advance and a rising standard of living have long been the hallmarks of Ontario's economy and society. Between 1961 and 1988, just over a quarter century, the volume of goods and services produced in Ontario almost tripled. The size of the labour force and the number of jobs in the economy doubled. Society's standard of living increased twofold.

A key contributor to this progress – as integral as investments in plant, machinery and new technologies – has been investments in people to develop a work force with higher level skills. Without improvements in both basic and technical skills, the capacity of workers to move between industrial sectors, to cope with the changing demands of the work place, and to share in the benefits of economic progress become severely constrained. Such constraints, in turn, retard the capacity of the economy to advance and provide increases in society's standard of living.

This interdependency is rooted in the reality that the demands for workers to take jobs in particular industries and occupations and to perform specific sets of tasks in those jobs are derived demands. The jobs created in the economy and the tasks to be done derive from a combination of society's demands for goods and services and the technical conditions of production for producing those goods and services. Economic growth and the improvements in society's standard of living it yields is based on adjustments in the economy that shift the mix of jobs in favour of "knowledge workers". Jobs which require more advanced levels of knowledge and skills increase in importance and those characterized by heavy manual work or repetitive unskilled or semi-skilled tasks decline in importance.

While this pattern is not clearly perceptible in the short term, over the longer term it becomes very evident. The share of jobs in the economy accounted for by managerial, administrative, and professional and technical occupations rose from 12.1 to 23.8 per cent between 1961 and 1986. Over the same time period, there were declines in the relative importance of semi-skilled office jobs, and those in processing and material handling, in machining, and in primary resource industries.

Paralleling this shift in the job mix, there was a substantial improvement in the quality of Ontario's work force. In 1961 only 4 per cent of individuals in the labour force had some formal postsecondary education or training and five per cent had a university degree. By 1986, these proportions had increased to 38 and 14 per cent respectively.

In the decade ahead, the demand side of the market will be a very dynamic one as advances in the economy that affect the mix of jobs and the skills workers require will continue unabated. Further, a number of marked changes on the supply side of the market, which began to appear in the 1980s, will come to the forefront strongly in the 1990s. The rate of labour supply growth will be much lower and the demographic characteristics of the work force will be very different. The labour market will be a challenging one indeed for both workers and employers.

A number of the more important trends on the demand and supply sides of the market and the factors underlying them are highlighted below and the labour market issues that they will generate in the 1990s are briefly discussed.

DEMAND SIDE TRENDS

Key factors that are influencing the demand side of the labour market include the growing importance of the service sector as the main source of new job creation; industrial restructuring in response to more intense competition from producers in other countries; and technological innovations to improve efficiency and product quality and to produce more sophisticated higher value-added products. Changes in the mix of jobs in the economy attributable to these factors accelerated in the 1980s.

SERVICE SECTOR EMPLOYMENT GROWTH

The growing importance of employment in the service sector is having a major influence on the relative importance of different types of jobs in the economy. Over the period 1961 to 1988, the number of jobs in the service sector more than doubled and its share of total employment in the economy moved upward from 55 to 68 per cent. The proportion of the work force employed in primary resource industries fell from 10 to 4 per cent, while the share for secondary industries (manufacturing, construction, utilities) moved downward from 35 to 28 per cent.

This greater concentration of jobs in the service sector should not be taken as a signal that other sectors are becoming less important to the strength of the economy. Many of the activities in Ontario's service sector are closely linked with its goods-producing industries through financing their production, advising on their design and most efficient methods of production, and promoting and distributing them (marketing, advertising, transportation and trade).

As well, the goods producing industries continue to make substantial contributions to the output of the economy and increases in society's wealth. Productivity improvements in goods producing industries and their success in competing in the international market place are important determinants of the service sector's capacity to expand.

INDUSTRIAL RESTRUCTURING

Industrial restructuring forced by tougher competition in trade is also affecting the demand side of the labour market. Successive declines in tariff protection negotiated under the General Agreement on Tariffs and Trade (GATT) has led to Ontario's firms becoming much more open to competition from producers in other countries. They are being affected by competitors from countries at various levels of economic development, especially newly developing countries where competition is based on very low labour costs, and newly industrialized countries where competition is based on low labour costs plus imported technology and capital investment.

Not surprisingly, imports of products for which low labour costs provide the basis for a competitive advantage – leather products; footwear; spun yearn and cloth; and men's, boys, and women's clothing – have increased their share of the market in Ontario. Further, in standardized products which require a higher level of capital investment but that have well-developed production technologies – tires and tubes; tools and cutlery; small electrical appliances; and large durable consumer appliances – import penetration of Ontario's domestic market has also increased. Manufacturers in these

product lines are being forced to adjust by introducing measures to improve efficiency, concentrating on product lines in which a comparative advantage can be maintained or by moving resources to other economic activities.

As the Ontario's Premier's Council has emphasized, the challenge for Ontario's firms is to adjust to international pressures by trading up to higher value-added products in which comparative advantage is based on investment in research and development, high technology applications, and a highly skilled work force. The alternative, which is not acceptable, is to accept a declining standard of living and an erosion of the social infrastructure and the level of social services. As the challenge is met, changes in the industrial structure and the occupational mix of Ontario's economy will continue, changes that will continually shift demand away from lower-skilled jobs to higher-skilled ones requiring more advanced levels of education and training.

TECHNOLOGICAL INNOVATIONS

Technological innovations introduced by firms to increase productivity, improve quality, and produce new goods and services is also affecting the mix of jobs in the economy. These innovations cover a wide range of technologies and applications – from advanced mechanical equipment to biotechnology, lasers, and new-materials technologies. But those that are having the most wide-reaching effects are the microelectronic and computer based technologies. Advances in these areas have made it possible to develop and implement programmable machines with built-in capabilities for information processing, analysis, and control.

In Ontario's manufacturing industries, the introduction of microelectronic or computer based applications is well underway. These involve applications such as computer aided design (CAD) or computer aided engineering (CAE); CAD output to control machines (CAD/CAM); computer-numerical control machines (CNC); automated sensor-based inspection or testing equipment; programmable controllers;computer integrated manufacturing (CIM) and material requirement planning (MRP). The service industries have also introduced a substantial number of computer-based technological innovations. These involve the use of minicomputers and on-line terminals; computerized financial, inventory-control, and order-entry systems; electronic messaging systems; electronic scanning systems and electronic funds transfer; and desk top publishing.

The new technical conditions of production created by these technologies are having profound effects on staffing patterns for reasons beyond their productivity effects. They change the relative importance of different types of jobs in the production process, and also lead to changes in organizational structure because they make it possible to operate with greater decentralization of responsibility. More authority is delegated to employees at lower-than-traditional levels and a flatter hierarchy emerges. The organizational and communication lines between those responsible for the leadership of the organization and those responsible for the production and delivery of goods and services become shorter. Instead of managing production and delivery processes, managers become resource people for individuals or working teams, accountability is ensured by monitoring outcomes, and intervention occurs only when outcomes are below standard.

IMPACT ON THE OCCUPATIONAL MIX

With these factors influencing the demand side of the labour market, many stable occupational employment growth patterns observed in earlier years have disappeared as jobs within organizations are restructured and industry staffing patterns shift.

The hierarchy of jobs in the management category began to be restructured in the 1980s. Strong acceleration in the growth of general manager positions arose, growth in jobs for specialized managers moderated sharply, and jobs for first-line supervisors began to decline. This restructuring came partly from reorganization and downsizing during the severe 1981-1982 recession. But it also reflects continuing drives for efficiency through corporate "lean and mean" policies and the longer-term productivity and organizational effects associated with computer-based technological innovations.

The application of computer-based technologies to information processing, the production of documents, and the communication of information has reduced the demand for workers to undertake many clerical and related functions in offices.

Employment growth turned negative in the 1980s across a number of occupations that involve the processing, machining, shaping and forming of various materials. This partly reflects the decline of some goods producing industries in the face of competition from offshore producers; but the more pervasive factor is investment in new technologies – the diffusion into the work place of computer controlled machines, pick and place and other robots, programmable controllers, and automated sensor based inspection or testing equipment.

For jobs in the professional and technical category, those in health care, education and social services have had the most stable and higher growth rates. Not a surprising observation, since employment changes in these areas are driven mainly by population dynamics and society's demands for health, education and social services rather than the vagaries of market demands for goods and competition in the international market place.

Employment in artistic and literary occupations has also grown in importance, which reflects a number of influences. As society's wealth, educational attainment, and leisure time increase, the demand for the products and services of artists, painters, sculptors, writers, actors, and musicians increases. With the expansion of the communications industry and growth in marketing and advertising, employment for writers, editors, announcers, and advertising and illustrating artists has also expanded.

In contrast, increases in job opportunities for a number of professional and technologist occupations in science, engineering and mathematics became more moderate in the 1980s. In part, the severe 1981-1982 recession played a role here, but industrial restructuring is the cause in the longer term as the number of positions for them declined in some industries and increased in others.

In general, positive growth in skilled trades jobs continued in the 1980s. However, employment in the skilled trades is also influenced by industrial restructuring, and technological innovations. Accordingly, some have fared better than others. Employment for tool and die makers and machine tool set-up operators, and for electrical equipment installers and electronic equipment installers, for example, has

grown steadily. On the other hand, jobs for forgers, boilermakers and platers and rail transport equipment mechanics are declining.

As one would expect, strong growth in the trade and personal services industries has meant expanding employment opportunities for salespersons in both commodities and services, and in personal service occupations.

THE DECADE AHEAD

Many of the trends and shifts in employment patterns observed in recent years are projected to continue throughout the next decade.

In the 1990s, the service sector will account for more than three quarters of the new jobs created in the economy. This expansion will involve employment increases at both the lower and higher levels of the skills spectrum. There will certainly be an increase in the number of traditional service jobs, such as salespersons and food and beverage servers. There will also be substantial growth in the managerial, professional, and technical jobs that require advanced levels of education and training. The latter will be especially striking because of the significant contributions to job creation that will be made by finance, insurance, and real estate services, health services, and business services. Taken together, these components of the service sector will contribute 43 per cent to total employment growth in the 1990s.

Industrial restructuring will also continue to influence the mix of jobs in the economy. The current Uruguay Round of GATT negotiations to reduce protective trade practices further and the implementation of the Canada United States Free Trade Agreement means Ontario's firms will be even more open to competition from firms in other countries.

The diffusion of technological innovations in the work place will continue. This will occur in both goods and service producing industries as firms seek to improve efficiency and the quality of their goods and services, and to trade up to higher value-added product lines. Consequently, the relative importance of different types of jobs in organizations will continue to change.

Overall, the mix of jobs in Ontario in the decade ahead will shift further towards those that require more advanced levels of education and training. In total, managerial, professional and technical and skilled trades jobs will account for more than half (55 per cent) of total forecast employment growth to the end of the century. Among the large array of professional and technical jobs in the economy, opportunities for computer specialists, social workers and others in community and welfare work, and for professional and technical jobs in health care – nurses, therapists, technologists, and technicians – will have the highest growth rates.

Many of the other trends observed in the 1980s are projected to continue in the 1990s. Jobs in sales and service will grow strongly as expansion in retail trade and personal service industries continue. The demand for individuals to fill clerical jobs and for first-line supervisors will be considerably weaker in the decade ahead. Little growth is expected in processing jobs, and those in machining are projected to decline. Very moderate expansion in job opportunities is expected in product fabricating and assembling and materials handling.

SUPPLY SIDE TRENDS

The supply side of Ontario's labour market in the 1990s will have some very different characteristics compared to recent decades. Labour shortage will be the norm, the work force will be much older on average, retirements and replacement needs will increase, and women will account for close to one-half of Ontario's work force by the year 2000.

Ontario's labour force is projected to grow by 1.5 per cent per annum in the 1990s, down from a high of 3.2 per cent per year in the 1970s and 2 per cent in the 1980s. Underlying this decline in the labour supply growth rate is a fall off in the number of young people (15– to 24-year-olds) entering the work force. In the 1970s, a large number of post-war baby boomers completed their education and entered the labour force; but young new entrants began to decline in the 1980s as the large baby boom cohorts were replaced by much smaller groups of young people. This trend will continue throughout the 1990s. On average, between 1990 and the year 2000 there will be zero growth in the number of young people in the labour force.

Over the next ten years, Ontario's work force will become much older as the baby boomers move into older age cohorts and are replaced by smaller numbers of younger people. The fastest growing group in the 1990s will be 45– to 54-year-olds. Their share of the total labour force will increase from 16 to 21 per cent between 1990 and 2000. In contrast, the shares of both 15– to 24-year-olds and 25-to 44-year-olds will decline over the decade. By the first decade of the next century, only 11 years from now, 55– to 64-year-olds will be the fastest growing component of Ontario's labour force.

The labour force participation rate of women is projected to continue to rise throughout the 1990s. Women will account for approximately two-thirds of total labour supply growth between 1990 and the year 2000. By the end of the decade, their share of the total work force will be 48 per cent.

With an aging work force, replacement needs attributable to retirements will rise. The overall rates of labour force withdrawal attributable to retirements and deaths will increase to 19 per cent, up an estimated two percentage points from 17 per cent in the 1980s. This will be followed by an even sharper rise in the first decade of the next century when 55– to 64-year-olds will be the fastest growing group in the labour force. These developments, especially when coupled with zero growth in the number of young people in the labour force, will compound employers' recruitment problems.

Retirement and replacement needs will be especially high in the 1990s in occupations that have an above average proportion of older workers. Examples of those where these replacement needs will be roughly one-quarter or more include general managers, managers of construction operations, university teachers, community college and vocational school teachers, brick and stone masons and tile setters, hoisting occupations, and bus drivers.

Another development on the supply side of the labour market, one which emerged in the 1980s, that merits highlighting is the pattern of declining enrolments in college and university technology and engineering programs and little growth in apprentice registrations for training in the skilled trades. This is a disturbing development, since it can ultimately lead to a reduction in the number of persons entering the labour market who are qualified to fill jobs in the engineering, technologist and skilled trades categories.

Whether or not these enrolment patterns represent a short-term phenomenon or a long-term shift in the preferences of young people – a shift away from careers in engineering and technical occupations towards careers in other areas of endeavour – is not known. If a long-term shift in preferences is indeed occurring, it will create problems in the long term because it comes at a time when technical and engineering jobs are becoming more important in the staffing patterns of many industries.

To overcome shortages of qualified workers to fill these jobs, Ontario can no longer rely heavily on immigration. The proportions of working age immigrants coming to Ontario who take jobs in managerial, administrative, professional and technical occupations have decreased in the past decade. The occupations for which immigration has become more important include jobs in service and in product processing, fabricating, and assembling.

LABOUR MARKET ISSUES IN THE 1990s

With managerial, administrative, professional and technical jobs becoming more important and the tasks they involve more complex, the quality of the work force must rise. Investments in people to strengthen both their basic skills and technical skills will be a high priority.

Shortages of skilled persons who are capable of working with the new technologies being introduced into offices and plants encountered by employers in the 1980s will persist. Firms will find that recruiting workers to fill engineering, technologist and skilled trades jobs will be an increasingly tough proposition. Although the introduction of more sophisticated production technologies is making these jobs increasingly important in staffing patterns, enrolment patterns in engineering, technology, and apprenticeship programs means a potentially severe shortfall of persons in the labour market who are qualified to fill these types of positions.

Further, more firms will encounter problems when they introduce new technologies or implement changes in the organization of work because their employees' basic skills are inadequate. This became a serious problem in the 1980s, but it should not have been an unexpected one given the substantial proportions (in the 50 to 60 per cent range) of workers in processing, machining, fabrication and assembly, and materials handling jobs who have less than a secondary school education.

The new technologies mean that tedious and repetitive semiskilled or unskilled tasks and those that require substantial physical strength are replaced by requirements to read instruction manuals, take measurements, use computer keyboards to input information, and to understand statistical reports. To make the transition, many workers will need to strengthen some of their basic skills – not an easy adjustment for individuals who have long years of service in very specific jobs and for whom learning the three R's is but a very distant memory. Initiatives to assist these workers to upgrade their basic skills will become more urgent.

To deal with a general labour shortage situation and ensure they have the high-quality and adaptable work forces they require, many employers will have to re-examine their recruitment, human resource development and management policies and practices. Assigning a higher priority to retaining and retraining workers whose jobs become redundant will be essential.

In addition, it will be important for firms to tap the talents of groups in the labour force who are underutilized relative to the skill levels they possess. In this regard, women are a prime example. In general, women in Ontario's work force have educational attainment levels equal to or better than those of men, 32 per cent of them have completed a postsecondary certificate or degree program compared to 28 per cent for men. There is a sizeable disparity, however, between the types of jobs typically held by women and men. Close to 60 per cent of all employed women are found in clerical sales and service jobs. To circumvent labour shortages and maintain high quality work forces, one option open to employers is to provide women with more opportunities for upward mobility in organizations and to move into technical areas.

In an environment of general labour shortage, programs to assist displaced workers to find alternative employment will be essential. When workers become redundant because of industrial restructuring or technological innovations, providing them with opportunities to retrain and move to productive and rewarding jobs elsewhere will not only be the fair or equitable action to take, it will also be a necessary action to reduce labour supply shortages.

Periodic skills upgrading will become a way of life for persons in many occupations. As firms continue to strive to become more efficient, to improve the quality of their products and services, and to trade up to higher value added product lines, microelectronic and computer-based innovations will diffuse further into workplaces and new generations of them will be developed and applied. Workers in diverse areas – design and engineering; installation, maintenance, and repair of machinery and equipment; fabrication; materials handling and planning; information processing and communications – will have to update their skills many times during their careers. Programs sponsored by employers or pursued by employees on their own initiative will be imperative.

The evolving changes in the jobs mix have major implications for the types and levels of skills young people (and others) need to cope effectively with the world of work when they enter the labour force. Proficiency in basic mathematics, reading, writing, reasoning, and interpersonal skills will be requisites to do well in the labour market. Without adequate grounding in these basic skills, persons entering the work force will find it increasingly difficult to compete for rewarding jobs, to learn specific job-related tasks and to master new tasks when the content of jobs change. These messages have to be transmitted to young people in the elementary and secondary schools as clearly and frequently as possible.

CHAPTER 1

Introduction

Growth and change have long been the hallmarks of Ontario's economy and its labour market. During the 28-year period from 1961 to 1988, the volume of goods and services produced in Ontario almost tripled. Society's standard of living, as measured by total goods and services produced per person, increased twofold. The size of the labour force and the number of persons employed doubled.

This long period of progress – more than a quarter century – saw fundamental changes in the structure of Ontario's economy, changes that were reflected in marked shifts among its major sectors. The share of total employment accounted for by primary industries (agriculture, mining, forestry, fishing, and trapping) and secondary industries (manufacturing, construction, and utilities) declined, while employment in the tertiary or service sector expanded until it accounted for over two out of every three jobs in the province by 1988. On the output side of the economy, not surprisingly, the share of the total accounted for by primary industries declined, while the tertiary sector's share increased. Because of substantial productivity gains, the secondary sector maintained its share of total output despite the decline in its employment share.

As these structural changes in Ontario's economy evolved over the 1961-1988 period, a series of other adjustments took place. Principal among these were industrial restructuring and technological innovations to position Ontario's economy relative to its competitors in the world of falling trade barriers that had come to the forefront with a vengeance by the mid-1970s. These adjustments continue today and will be a dominant characteristic of Ontario's economy in the 1990s.

The process of economic growth and change yields increases in wealth and society's standard of living. A part of that process – as integral as investments in plant, machinery, and new technologies – is investment in the development of human resources. Without improvements in skill levels, workers are severely constrained in their ability to move between sectors of the economy, to cope with the changing demands of the workplace, and to share in the benefits of economic progress. Such constraints, in turn, retard the capacity of the economy to evolve and advance.

This interrelationship is based on the reality that the demands for workers to take jobs in particular industries and occupations and to perform specific sets of tasks in those jobs are derived demands. The jobs in the economy and the tasks to be done derive from a combination of society's demands for goods and services and the technologies used in producing those goods and services. As economic growth and adjustment occur and society's standard of living improves, changes in both the technical conditions of production and the distribution of demands for goods and services shift the mix of jobs in favour of the people Peter Drucker terms "knowledge workers".[1]

Knowledge workers have relatively high levels of education and training, are the experts in their jobs, perform with less supervision than other workers, and have well-developed capacities to communicate with others, to analyse problems, and to make decisions. Thus, economic advance involves an increase in the importance of

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[1]Peter F. Drucker, Managing In Turbulent Times (New York: Harper and Law, 1980), pp. 23-28.

jobs that require higher levels of knowledge and skills and a decline in the importance of jobs characterized by heavy manual work or repetitive unskilled tasks in a very structured environment.

The purpose of this study is to analyse changes in the job mix of Ontario's economy and their implications for skills development. As a springboard, Chapter 2 reviews in more detail a number of trends in Ontario's economy that have affected demand in the labour market during the past 28 years: shifts in the shares of output and employment across industry sectors and differences in productivity improvement among them, industrial restructuring, and technological innovations. Chapter 3 provides an analysis of how the mix of jobs in Ontario has evolved over time in response to these changes in the economy. Chapter 4 uses a projection to the year 2000 of trends in the demand for labour across occupations to offer a number of insights into future shifts in the occupational mix and their implications for the educational and training requirements of the work force. Having examined past and future trends on the demand side of the labour market, the study then turns to the supply side. Chapter 5 presents a projection of labour supply growth and changes in the demographic characteristics of the work force during the decade ahead, along with a review of sources of new labour force entrants with advanced levels of education and training. The study concludes (Chapter 6) with a discussion of labour market issues that will become much more important in the 1990s, issues that should be of concern to decision-makers and policy-makers in both the private and public sectors.

CHAPTER 2

Economic Growth and Adjustments: The Impact on the Job Mix

Economic progress leads to changes in the mix of jobs and the education and training levels required of the work force, but its implications are imperceptible at any single point in time. To discern what is going on, one must examine developments over a number of years, which is the objective of this chapter. The sections that follow outline long-term shifts in the shares of output and employment across industry sectors and note underlying differences in productivity improvement as the economy evolves. As well, the text provides a summary review of adjustments arising from industrial restructuring in response to international trade pressures and technological innovations in the workplace. The chapter concludes with a broad overview of how these developments are reflected in the occupational mix of Ontario's economy and the educational attainment levels of the work force.

Shifts in Shares of Employment and Output across Industry Sectors

As an economy evolves over the long term, changes in both the industrial and the occupational mix occur. The usual evolution is from an economy that depends heavily on agriculture and other primary-resource activities to one in which manufacturing plays the most important role, and ultimately to one in which the service sector becomes the dominant employer. This pattern has major implications for the mix of jobs in the economy and the skills required because the occupational composition of employment differs markedly by industry, an obvious but very important observation. When an industry (or a whole sector) declines in importance as an employer, the people who would otherwise have worked in it are available to bolster the labour force in other areas, but they will need different skills to do so.

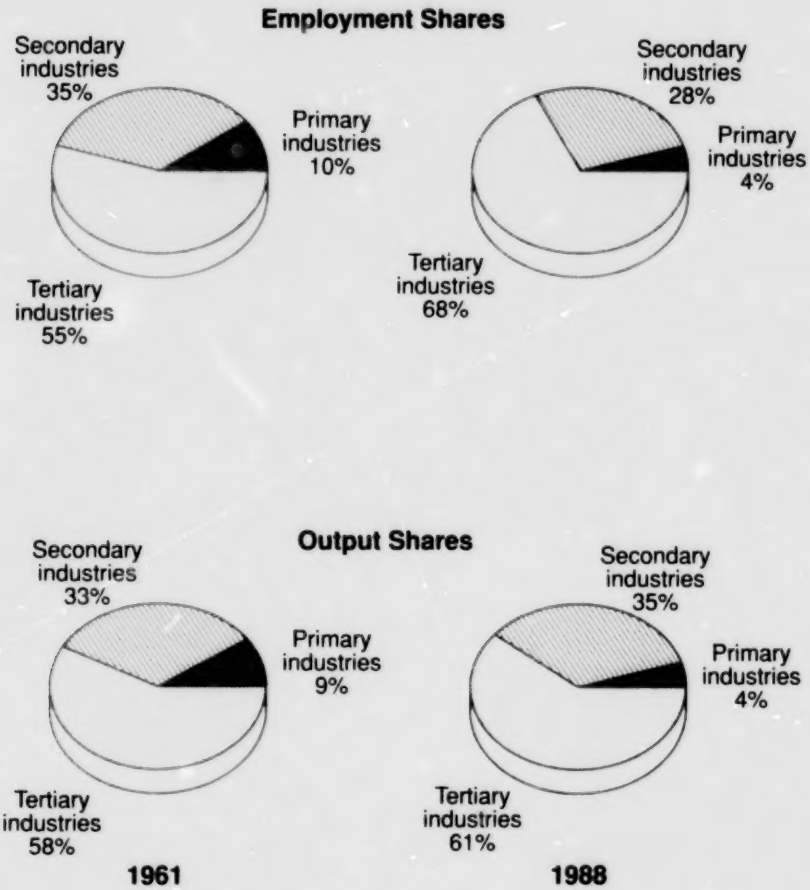
Although Ontario's economy was highly developed by 1961 – that is, a large portion of its output and employment was in the tertiary or service sector – long-term development continued during the next 28 years (Chart 1). The proportion of the work force employed in primary industries fell from 10 to 4 per cent. Agriculture's share of total employment moved down from 7 to 3 per cent, and the number of farm workers declined absolutely. For secondary industries, the share of employment also fell, even though the number employed in manufacturing rose by approximately 408,000. The tertiary sector showed the largest capacity for job creation: employment more than doubled, and the share of total employment moved upward from 55 to 68 per cent. Within the tertiary sector, the categories of trade and of community, business, and personal services recorded the largest employment increases, 491,000 and 1,115,000 respectively.

Output changed across sectors in a somewhat different pattern between 1961 and 1988 (Chart 1). Primary industries' share of output dropped, while secondary industries and the tertiary sector made small gains.

Although shifts in the shares of employment and output occur over time, it does not follow that one sector becomes less important than another to the strength of the economy. For example, many of the activities in Ontario's tertiary sector today are closely linked with its goods-producing industries through financing their production, advising on their design and most efficient methods of production and promoting and distributing them (marketing, advertising, transportation, and trade).

As well, public administration, communications, health, and education provide essential infrastructure. The result is an interdependence among the different sectors of the economy.

Chart 1
Output and Employment Shares
by Sector, Ontario, 1961 and 1988

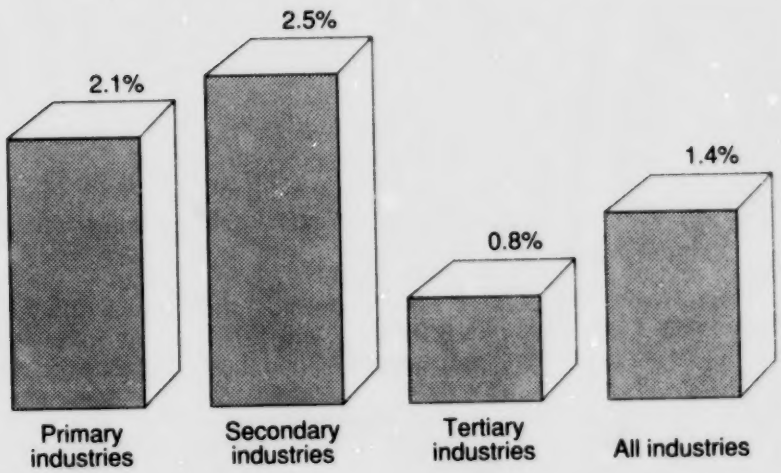


Source: Based on output estimates from The Conference Board of Canada's AERIC systems and on employment data from Statistics Canada's Labour Force Survey.

A key factor underlying these shifts in employment across sectors has been variation in productivity improvement. Productivity, as measured by output per employed person,[2] is the essential link between output and employment. Taken together, changes in productivity and in the distribution of output across industries determine changes in the industrial employment mix over time. The two factors may work in the same direction or in opposite directions. An increase in an industry's share of output will lead to an increase in its share of total employment if its productivity is growing at a rate below the average for the economy. In contrast, if an industry's productivity is growing above the average for the economy, its employment growth will likely be below average and the industry's share of employment will decline.

Chart 2 shows changes in productivity by sector, as reflected in the annual percentage change in output per employed person, between 1961 and 1988. Productivity in Ontario's primary and secondary sectors increased at a faster rate than the average for all industries, and these two sectors' share of total employment fell. At the opposite end of the scale, the tertiary sector had the lowest productivity growth and the largest increase in employment share.

Chart 2
Annual Percentage Change in Output per Employed Person, Ontario, 1961-1988



Source: See Chart 1

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[2]Economists distinguish between labour productivity (output per employed person) and total factor productivity (output in relation to all of the factors of production). The latter is conceptually the best indicator of change in productivity, but it is most difficult to calculate. Labour productivity is the measure used in this study.

Such differences in productivity performance are central to the changing structure of employment as economic development unfolds. Substantial productivity gains in agriculture free workers from this sector to meet labour needs for the production of goods in the secondary sector, a pattern that eventually extends to industries in the tertiary sector. As economic development continues and society's wealth increases, demands for services – education, health care, and personal and business services – grow more rapidly than demands for goods. Such structural changes lead to employment shifts with implications for the relative importance of different types of jobs in the economy.

Economic Adjustments and the Job Mix

As an economy evolves over the long term, there are a variety of adjustments, large and small, that affect the nature of job opportunities available to members of the labour force.

Although the sources of these changes are diverse, two that have given rise to the most extensive adjustments in the occupational mix of Ontario's economy in recent years include:

- Reduction in protective tariffs between countries that have led to tougher competition in the production and sale of goods and services in the international market place.

- Technological innovations in the production and sale of goods and services.

Changes in International Competition

Shifts in international trade patterns usually lead to considerable industrial restructuring as some firms enter the international marketplace, others strive to maintain or strengthen their competitive positions in domestic and international markets, and still others are forced out.

Successive declines in tariff protection negotiated under the General Agreement on Tariffs and Trade (GATT) – the Kennedy Round (1966-1970) and the Tokyo Round (1979-1987) – have led to sizeable tariff reductions and thus to much tougher import competition for Canadian firms and workers, accelerating the pace of industrial restructuring. Adjustments related to the move towards greater liberalization of international trade will continue throughout the 1990s with the completion of the current Uruguay Round of GATT negotiations and the full implementation of the Canada-United States Free Trade Agreement.

With declines in tariff protection, Ontario's firms have found themselves open to competition from countries at various levels of economic development:

- Competition based on very low labour costs in newly developing countries (for example, Sri Lanka and Thailand).

- Competition in highly standardized products based on low labour costs and imported technology and capital investment in newly industrialized countries (for example, South Korea and Mexico).

- Competition in knowledge-intensive products based on research and development and investments in high technology applications, education, and training from developed countries (for example, Japan, West Germany, and the United States).

Compounding the pressures on highly developed economies, such as Ontario's, to adjust is the interplay between trade liberalization and another set of realities: capital is very mobile; investments in well-developed and highly standardized production technologies can be easily made in newly developing countries; and transportation costs have declined. These realities have created opportunities for firms in developed countries to locate plants or to subcontract production to developing countries, taking advantage of lower labour costs there. In addition, the life cycle of products has become shorter, which means firms have to place a greater emphasis on new-product development to maintain viability.

Not surprisingly, imports of products for which low labour costs provide the basis for a competitive advantage – leather products, footwear, spun yarn and cloth, and men's, boys', and women's clothing – have increased their share of the market in Ontario. Further, in standardized products that require a higher level of capital investment but that have well-developed production technologies – tires and tubes, tools and cutlery, small electrical appliances, and large, durable consumer appliances – import penetration of Ontario's domestic market has also increased.

Ontario's manufacturers in these product lines are being forced to adjust in response to the reductions in tariff protection and the more intense competition from offshore producers with low labour costs. Companies reduce staff levels in efforts to improve efficiency. Operations are downsized to concentrate on product lines in which a comparative advantage can be maintained. Plants are closed and resources are reallocated to other economic activities. Consequently, employment levels in the affected industries fall and the occupations unique to them decline in importance.

The liberalization of international trade has a positive side too. It creates opportunities for Canadian manufacturers to expand exports in products for which comparative advantage is based not on low labour costs but on investment in design, development of sophisticated production technologies, and employment of well-trained and highly skilled workers. Ontario manufacturers have thus improved their trade balance (the total value of exports has increased faster than the total value of imports) in high value-added products such as plastic pipe and pipe fittings, furniture and fixtures, fabricated structural metal, heating equipment, office, store, and business machines, and aircraft and aircraft parts. In addition, after a period of retrenchment and restructuring in the early 1980s, automotive manufacturers and producers of automotive parts strengthened their competitive position and rebounded through investments in new plant, production technologies, and the skills of their workers. As these industries compete successfully in both domestic and international markets, employment in them, especially in the occupations unique to them, increases in relative importance in Ontario's labour market.

As the Premier's Council has emphasized, Ontario's manufacturers must respond to international pressures by trading up to higher value-added products in which comparative advantage is based on investment in research and development, high

technology applications, and a highly skilled work force.[3] The alternative, which is not acceptable, is to accept a declining standard of living and an erosion of the social infrastructure and the level of social services. As the challenge is met, changes in the industrial structure and the occupational mix of Ontario's economy will continue, changes that will continually shift demand away from lower-skilled jobs to higher-skilled ones requiring more advanced levels of education and training.

Technological Innovations

Another element of change in the economy that affects the mix of jobs is technological innovation introduced by firms to increase productivity, improve the quality of products and services, and produce new product lines. This process is, of course, present in almost all economies during all phases of development, but the nature of innovations has changed recently: they have been having profound effects on how goods and services are produced and delivered and on employers' staffing patterns.

During the 1950s, 1960s, and most of the 1970s, the innovations in the production of goods and services that North American firms put in place were mostly diffusions or modifications of known technologies, and thus their effects on staffing patterns were minor. Since the latter part of the 1970s, however, the technological changes being introduced into the workplace have been based on more recent advances in knowledge and represented fundamental alterations in production methods. Accordingly, their implications for the organization of work and the mix of jobs in the economy are much more substantial.[4]

Innovations cover a wide range of technologies and applications – from advanced mechanical equipment to biotechnology, lasers, and new-materials technologies – but those that are having the most wide-reaching effects and will continue to have them throughout the next decade are the microelectronic and computer-based technologies. Advances in these areas have made it possible to develop and implement programmable machines that have built-in capabilities for information processing and information analysis and control. These technologies involve office automation (word processing, personal computer work stations, and office networks) and product design and manufacturing process automation (CAD, CAM, CIM, and automated inspection, quality control, and materials-handling systems). As well, they provide the basis for innovations in other areas of endeavour, such as communications (transmission of sound, pictures, and graphics), health care (bioelectronics and biogenetics), finance (automated tellers), and trade (automated inventory control and pricing systems).

The application of these technologies affect staffing patterns in firms and industries. For some jobs, the changes in production methods and the productivity gains generated by an innovation reduce their importance. For others, there is both a negative and a positive effect on employment – a negative one because of the productivity improvement and a positive one because the new technical conditions of production make the job more important. Examples of occupations that have become

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[3]Ontario, Premier's Council, Competing in the New Global Economy, report of the Premier's Council, vol. 1, (Toronto: Province of Ontario, 1988).

[4]See Drucker, pp. 48-60.

less important in the economy because of improvements in productivity and changes in staffing patterns associated with the new technologies include telephone operators, materials handling and packaging, reception, mail, and messenger services, construction labourers, and general office clerks. In contrast, examples of occupations for which innovations in the workplace have increased their importance sufficiently to outweigh productivity effects include electronic data-processing equipment operators, electronic installers and repairers, and systems analysts and computer programmers.[5]

Changes in staffing patterns within firms and industries do not, of course, occur instantaneously. The planning and implementation periods for technological innovations can be very long, and only after experimentation and fine-tuning of an application do the full effects on staffing patterns evolve. In addition, the overall impact on the job mix depends on how quickly innovations diffuse throughout industries. Ultimately, however, the development and adoption of new technologies do have real effects on the job mix. Telephone operators go the way of buggy-whip and carriage makers and are replaced by electronic repair specialists, mechanics, and technicians. As new techniques are employed in office work and the production of goods and delivery of services, the emphasis shifts from semiskilled jobs to higher-skilled technical jobs that place a premium on knowledge rather than physical strength or a capacity to undertake repetitive tasks for long periods of time.

Changes in Occupational Demand

The interplay of the factors discussed above – changes in the shares of output across sectors, differing rates of productivity growth, shifts in the shares of employment by industry, industrial restructuring in response to increased international competition, and the influence of technological innovations on staffing patterns within firms – brings about changes in the occupational mix of the economy.

A comparison based on Census data for 1961 and 1986 (Table 1) reveals the broad outline of shifts in occupational demand over time and confirms that the long-term trend in the job mix places a priority on knowledge workers. Managerial positions and professional and technical positions in natural sciences and engineering, social sciences, teaching, and medicine and health care made large gains in their shares of the total work force between 1961 and 1986. The share of clerical jobs also increased, but as will be shown in the next chapter, growth in this occupation peaked in 1981. All the other occupations shown in Table 1 lost ground. The decline in the share of jobs in the economy accounted for by processing and material handling, machining and related occupations, and the construction trades reflects substantial productivity gains. Similarly, productivity gains have reduced the share of jobs in the primary sector of the economy.

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[5]These examples of occupations that have declined or increased in importance are taken from Economic Council of Canada, Innovation and Jobs in Canada (Ottawa: Ministry of Supply and Services, 1987).

Table 1
Shares of the Labour Force
Selected Occupations
Ontario, 1961 and 1986

Occupation	Percentage of total labour force 1961	1986
Managerial, administrative, and related	3.3	9.0
Professional and technical		
Natural sciences, engineering, and mathematics	2.6	4.1
Social sciences and related	0.6	2.0
Teaching and related	2.7	4.1
Medicine and health	2.9	4.6
Clerical and related	16.9	19.6
Sales	11.8	10.6
Service	13.4	12.6
Processing and material handling	7.4	5.3
Machining and related	3.9	3.0
Product fabricating, assembling, and repairing	9.1	9.0
Construction trades	8.3	5.6
Transport equipment operating	4.0	3.4
Primary		
Agriculture	8.4	3.3
Other	1.6	0.6

Note: The data exclude persons not classified to an occupation in the census year. Data are for the experienced labour force only (that is, they exclude labour force entrants who had not found a job at the time of enumeration).

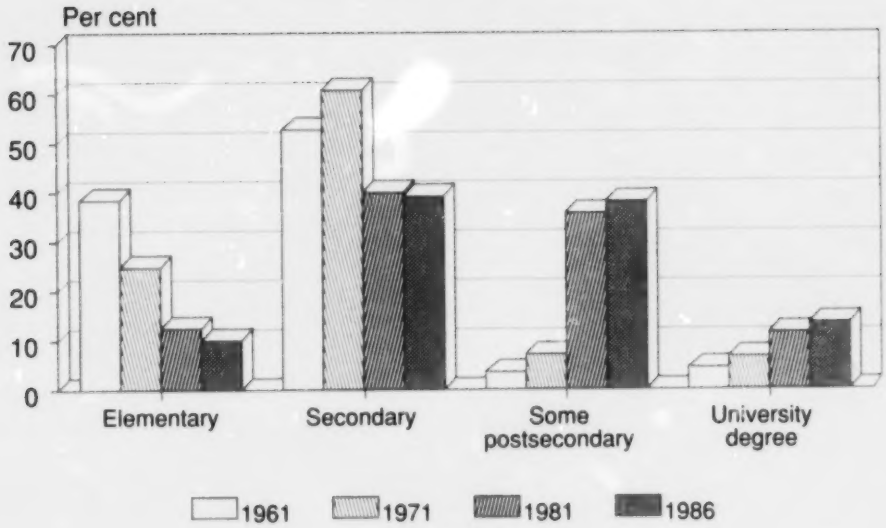
Source: Based on data from Statistics Canada, Occupational Trends, 1961 and 1986, catalogue no. 93-151.

Changes in Educational Attainment

Paralleling these trends in the occupational mix between 1961 and 1986 were significant increases in the educational attainment levels of Ontario's labour force (Chart 3). Those in the labour force with an elementary school education or less declined from more than one in three to fewer than one in ten over the 25 – year period. The proportion who had attended secondary school (grades 9 to 13) rose eight percentage points between 1961 and 1971 and then declined sharply in subsequent

years as the proportions in the some postsecondary education and university degree categories showed large gains.

Chart 3
Distribution of the Labour Force by Level of Educational Attainment
Ontario, 1961-1986



Note: Elementary includes persons who have 8 years of education or less.

Secondary includes persons who either completed or had some secondary school education.

Some postsecondary includes persons who have taken a postsecondary education or formal training program but without a university degree.

University Degree includes persons who completed university education with degrees.

Source: Statistics Canada, Census data.

A large part of the groundwork for these upward shifts in educational attainment was laid in the 1960s. During the early part of that decade, the huge group of postwar baby boomers began moving into the secondary schools. One result was substantial investments to expand Ontario's secondary school system, an expansion that was engineered through a combination of provincial initiatives and federal funding. In the second half of the 1960s came initiatives to strengthen the province's Apprenticeship Training Program and other employer-based training programs. Ontario also began to develop its system of Colleges of Applied Arts and Technology to provide a

postsecondary education and training option for young people who did not want to attend university or did not have the prerequisites to go on to university. The later 1960s were also a period of substantial expansion in the university system as baby boomers moved through the secondary schools and presented themselves for entry into the universities.[6] By the 1970s most of the education and training infrastructure that exists today had been put in place.

Summary

To summarize briefly the main points developed in this chapter, job requirements in the economy are influenced by variations over time in the final demands for goods and services, by productivity improvements, by industrial restructuring, and by technological innovations. Since the demand for labour is a derived demand, economic advances shift the occupational mix continuously towards jobs that require higher levels of education and training.

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[6]For a review of this period of expansion in Ontario's education and training systems, see J. Stefan Dupré, David M. Cameron, Graeme H. McKecknie, and Theodore B. Rotenberg, Federalism and Policy Development (Toronto: University of Toronto Press, 1973).

CHAPTER 3

Trends in the Occupational Mix of Ontario's Economy

The previous chapter's overview of changes in the job mix was based on very broad occupational categories. Within each grouping are large numbers of more specific occupations. For example, the professional and technical category in science and engineering varies from physicists to biologists to electrical and industrial engineers to technologists and technicians. The factors that influence the job mix over time can affect these more specific occupations in different ways. Consequently, a more in-depth analysis into changes in the occupational structure of the economy is necessary to gain a full understanding of the underlying patterns and their implications for the education and training of the work force.

This more specific analysis is the purpose of this chapter. Before turning to it, however, it is important to present some additional background on factors generating employment patterns.

Industry Employment Growth Patterns

The previous chapter presented trends in employment and output for a complete twenty-eight-year period, which is a relatively long time in the life of a modern economy. Table 2 breaks out two more recent time periods: 1971 to 1981 and 1981 to 1988. During the 1970s, all the major sectors of the economy posted positive employment growth, although the service industries, especially personal services and business services, outpaced the goods-producing industries. A very different pattern emerged in the 1980s. Positive employment growth rates continued in the service industries, while negative or close to zero growth has appeared in primary industries, manufacturing, utilities, and transportation and storage. This pattern reflects more clearly the net effects of greater growth in the final demands for services than for goods, in labour productivity, and of industrial restructuring as changes in the level and mix of imports and exports occur.[7]

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[7]For an analysis of factors that influence interindustry employment shifts and their relative importance, see Garnett Picot and Laval Lavallée, Structural Change in Employment of Industries and Occupations, 1971-1981: An Input-Output Analysis, Discussion Paper no. 316 (Ottawa: Economic Council of Canada, December 1986).

Table 2
Average Annual Employment Growth Rates by Industry Sector, Ontario, 1971-1981 and 1981-1988

Industry Sector	1971 to 1981	1981 to 1988
Agriculture and related	1.0%	–3.4%
Other primary industries	0.7	–0.7
Manufacturing	2.2	–0.1
Durable goods	2.3	0.2
Nondurable goods	2.2	–0.5
Construction	1.3	4.3
Utilities	3.4	0.5
Transportation and communications	2.6	1.3
Transportation and storage	–	–0.5
Communications	–	4.4
Trade	3.5	3.4
Finance, insurance and real estate	4.3	4.0
Community, business and personal services	4.8	3.7
Education services	1.4	3.4
Health services	3.4	4.5
Personal services	12.1	1.1
Accommodation and food	4.0	3.0
Business services	10.2	5.8
Other services[a]	6.3	2.3
Public administration	3.0	1.3
All industries	3.2	2.2

[a] Includes religious organizations, amusement and recreation services, and miscellaneous services.

Source: Statistics Canada, Labour Force Survey.

Differences between sectors in output growth and in labour productivity improvement during the 1980s are shown in Table 3. Strong growth in output is evident for all sectors, as are marked variations in productivity improvement. For those goods-producing industries noted above as having negative or close to zero employment growth, there is

a close match between the annual growth rates of output and of labour productivity. In other sectors – trade; finance, insurance, and real estate; community, business, and personal services; and public administration – output growth rates outstripped growth in productivity and employment expanded.

Table 3
Average Annual Rates of Growth in Output and Labour Productivity by Industry Sector, Ontario, 1981-1988

Industry sector	Output[1]	Labour productivity[2]
Agriculture	0.9%	4.5%
Other primary industries	7.1	7.6
Manufacturing	4.3	4.2
Durable goods	5.2	4.7
Nondurable goods	3.2	3.6
Construction	7.0	2.5
Transportation, communication, and other utilities	4.0	2.9
Trade	6.1	2.6
Finance, insurance, and real estate	5.3	1.3
Community, business, and personal services	3.2	–0.5
Public administration	1.9	0.6
All industries	4.3	2.0

Note: The output measures are based on estimates of GDP by industry sector. The labour productivity measures are based on estimates of GDP per employed person.

Source: [1]Conference Board of Canada.

[2]Estimated based on Statistics Canada's Labour Force Survey and Conference Board of Canada's output data.

The substantial gains in labour productivity in the primary, manufacturing, and construction industries during the 1980s have been partly attributable to the introduction of new technologies to the workplace.[8] For the manufacturing sector, evidence on this point is provided in Table 4, which presents estimates, from a Statistics Canada survey, of the utilization of microelectronic or computer-based applications in production processes as of March 1989. The utilization measure is defined as the percentage of the total dollar value of manufacturing shipments for which selected technologies were used in the production process. On the basis of this measure, computer-aided design (CAD) and/or computer-aided engineering (CAE) had reached a utilization rate of more than one-half on a value-of-shipments basis in Ontario's manufacturing industries. The utilization rate for CAD output to control manufacturing machines (CAD/CAM) was almost 25 per cent. Numerical control or computer numerical control machines (NC/CNC) were associated with the production of one-third of manufacturing shipments in Ontario. In the same utilization range were automated sensor-based inspection or testing equipment technologies. As well, communications and control, manufacturing information systems, and integration and control technologies had reached significant levels of utilization.

As emphasized in the previous chapter, a major force pushing Ontario's manufacturers towards adopting new technologies is increased competition from producers in other countries. The development of a more open international trading environment is a process in which Canada is heavily involved. Between 1971 and 1985, the average tariff rate on dutiable imports coming into the country fell from 15.4 to 11.2 per cent, and the proportion of Canadian imports not subject to tariffs rose from 54 to 62.8 per cent.[9] With tariff protections being removed, manufacturers in Ontario and other regions of the country are facing much tougher competition from offshore producers, especially those with lower labour costs. For many firms, the only solution is to improve productivity and product quality and to trade up to the production of more sophisticated products.

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[8]Another factor contributing to the significant labour productivity gains in the goods-producing industries in the 1980s has been the improvement in productive capacity utilization as the economy moved out of recession into a prolonged period of economic expansion after 1982.

[9]Economic Council of Canada, Policies for Trade Sensitive Industries (Ottawa: the Council, 1988) table A-1.

Table 4
Use of Selected Technologies in Manufacturing Industries
Ontario, March 1989
(shipment weighted)

Technology group	Utilization rate
Design and engineering	
Computer-aided design and/or computer-aided engineering	53%
Computer-aided design output to control manufacturing machines	24
Digital representation of computer-aided design output in procurement activities	15
Fabrication and assembly	
Flexible manufacturing cells or systems	23
Numerical control/computer numerical control machines	33
Materials-working lasers	11
Pick-and-place robots	21
Other robots	23
Automated material handling	
Automated storage and retrieval systems	16
Automated guided vehicle systems	11
Automated sensor-based inspection and/or testing equipment	
For incoming or in-process materials	31
For final product	37
Communication and control	
Local-area network for technical data	44
Local-area network for factory use	41
Intercompany computer network linking plant to subcontractors	41
Programmable controllers	67
Computer control on factory floor	52
Manufacturing information systems	
Material requirement planning	51
Manufacturing resource planning	36
Integration and control	
Computer-integrated manufacturing	26
Supervisory control and data acquisition	37
Artificial intelligence and/or expert systems	9

Source: Statistics Canada, Survey of Manufacturing Technology, March 1989.

Substantial diffusion of computer-based technological innovations has also occurred in service industries. A survey of the sector conducted by Statistics Canada in 1989[10] found:

- Personal computers, minicomputers and on-line terminals have been widely adopted.
- Other widely used applications include computerized financial, inventory-control, and order-entry systems; local-area networks; and electronic messaging systems.
- Significant growth is expected in the utilization of desktop publishing, human resource management systems, computer-assisted education, expert systems, electronic scanning systems, electronic funds transfer, and computer-aided software engineering.

Microelectronic-based technologies can have profound effects on staffing patterns for reasons beyond their productivity effects. First, the new technical conditions of production change the relative importance of different types of jobs in the production process. Second, the new technologies lead to changes in organizational structure because they make it possible to operate with greater decentralization of responsibility. More authority is delegated to employees at lower-than-traditional levels, some management positions disappear, and a flatter hierarchy emerges. The organizational and communication lines between those responsible for the leadership of the organization and those responsible for the production and delivery of goods and services become shorter. Instead of managing production and delivery processes, managers become resource people for individuals or working teams, accountability is ensured by monitoring outcomes, and intervention occurs only when production or service delivery is below standard.[11]

Thus, technological innovations in the workplace have the potential to improve productivity, reduce overall labour requirements, and shift staffing patterns. One result is significant changes in the job mix.

Trends in Employment by Occupation

Given the variety of factors affecting employers' demands for labour, it is not surprising that there are substantial differences in employment growth across specific occupational categories. An analysis of these variations is undertaken by using employment growth rates for a fifteen-year period, 1971 to 1986, and for two

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[10]The survey, titled Survey of Technology Diffusion in the Service Industries, March 1989, covered the service sector excluding public administration, education, health, and social services. See The Daily, Ottawa, September 20, 1989.

[11]See Anthony P. Carnevale and Eric R. Schulz, "Technical Training in America: How Much and Who," Training and Development Journal, November 1988.

subperiods, 1971 to 1981 and 1981 to 1986.[12] Not all occupations are examined, but the cross-sections reviewed within major occupational groups are sufficient to provide insights on the key patterns and trends.

Managerial, Administrative, and Supervisory Occupations

With the world of business becoming more complex and sophisticated, managerial positions, especially those related to specialized functions, constituted one of the fastest-growing occupational groups between 1971 and 1986. For example, managers' positions in finance, personnel and industrial relations, sales and marketing, and transportation and communications recorded remarkable annual average gains in employment of about 15 per cent between 1971 and 1986, outpacing employment growth in the general manager category (see Table 5).

A comparison of the patterns for the subperiods reveals, however, that the 1980s saw considerable restructuring of managerial and supervisory jobs. Growth in general manager positions accelerated, it moderated sharply for managers of specialized functions, and many firms dropped a variety of first-line supervisory positions. These developments came partly from reorganization and downsizing during the severe 1981-1982 recession, but they also reflect longer-term drives for efficiency through corporate "lean and mean" policies and the productivity and organizational effects associated with computer-based technological innovations.

Growth in general managers' jobs and the increase in their relative importance in staffing patterns between 1981 and 1986 occurred in both goods-producing and service-sector industries. In absolute terms, the largest increases were in the service industries and government.

For some specialized managerial and first-line supervisory job categories, employment growth rates in the 1981-1986 period paralleled those recorded in the 1970s. Examples are administrators in health care and supervisors in food and beverage preparation and in sales. These represent situations where demands for services or goods has been a positive and dominant factor.

Professional and Technical Occupations in Science, Engineering, and Mathematics

Analysing what has happened in professional and technical occupations in science, engineering, and mathematics demands some fairly fine distinctions among kinds of jobs, kinds of industries, and subperiods. Among all the jobs in this broad category, those for systems analysts and computer programmers have grown the fastest. Employment for this group increased by almost 10 per cent per year over the fifteen-year period 1971-1986, a rate far higher than those for other professional and technical jobs in these areas (see Table 6).

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[12]Statistics Canada census data on employed persons by occupation for 1971, 1981, and 1986 were used in calculating employment growth rates.

Table 5
Average Annual Employment Growth Rates
Selected Managerial, Administrative and Supervisory Occupations
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Managers/Administrators			
General managers	5.0%	0.8%	14.1%
Natural sciences and engineering	12.8	19.2	1.3
Social sciences and related fields	11.6	14.9	5.7
Teaching and related fields	2.1	1.6	3.2
Medicine and health	8.2	8.2	8.3
Finance	15.7	22.8	3.2
Personnel and industrial relations	15.0	20.4	5.3
Sales and advertising	4.0	19.9	3.5
Purchasing	7.5	9.6	3.5
Services	14.6	20.6	4.1
Production	13.0	18.9	2.3
Construction operations	10.0	14.1	2.5
Transport and communication	14.5	22.2	1.1
Government administrators	4.6	4.9	3.9
Supervisors/Forepersons			
Clerical and related	–0.6	0.9	–3.4
Commodity Sales	0.6	0.3	1.4
Service Sales	2.3	0.0	7.1
Food and beverage preparation	6.1	6.9	4.8
Lodging and other accommodation	0.0	0.6	–1.3
Laundry and dry cleaning	–1.4	–2.1	–0.1
Materials processing	0.5	1.7	–1.8
Metal machining, shaping, and forming	0.1	0.9	–1.9
Other materials machining	1.1	2.1	–0.8
Metal products fabricating and assembling	3.1	4.0	1.4
Assembling, installing, and repairing	1.6	2.7	–0.5
Mechanics and repairmen, except electrical	2.0	4.1	–2.1
Construction	0.8	1.9	–1.4
Transport equipment operating	0.9	2.9	–2.9

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Table 6
Average Annual Employment Growth Rates
Selected Professional and Technical Occupations
In Science and Engineering
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Physical sciences			
Chemists	3.3%	3.6%	3.0%
Geologists	1.9	4.1	–2.4
Physical sciences technologists and technicians	–1.1	0.2	–3.0
Life sciences			
Agriculturists and related scientists	3.1	1.2	7.3
Biologists and related scientists	4.9	7.3	0.5
Life sciences technologists and technicians	–0.8	–0.5	–1.3
Architecture, engineering, mathematics, and related fields			
Architects	3.9	4.2	3.5
Chemical engineers	2.8	4.0	0.5
Civil engineers	2.0	3.0	0.1
Electrical engineers	4.6	6.0	2.1
Industrial engineers	3.3	4.8	0.3
Mechanical engineers	4.0	4.6	2.9
Mining engineers	1.5	2.7	–0.8
Aeronautical engineers	4.2	5.4	1.9
Surveyors	1.6	1.3	2.1
Draftsmen	1.4	3.2	–2.3
Architectural and engineering technologists and technicians	4.0	6.4	–0.6
Mathematicians, statisticians, and actuaries	2.4	3.2	1.0
Systems analysts, computer programmers, and related	9.8	9.6	10.6

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Comparisons over the subperiods reveals more moderate growth in the 1980s than in the 1970s. For geologists and mining engineers, employment growth turned negative in the 1980s, primarily because of an overall decline in the demand for workers in the mining industry. The employment of draftsmen declined after 1981, largely because of the introduction of computer-aided design technologies.

For physical science technologists and technicians, the trend in both the 1970s and 1980s reflects declining employment opportunities. Work for them in the mining and primary metal products industries has been declining since 1971, and between 1981 and 1986 these jobs also began to disappear in the rubber and plastic, pulp and paper, and chemical industries, in electric utilities, and in government.

There has also been negative employment growth for technologists and technicians in the life sciences overall. Employment opportunities increased for them in health services, but that rise has been offset by declines in the food, beverage, tobacco, and chemical products industries since 1971 and in forestry and government since 1981.

Part of the observed decline in employment for technologists and technicians in the physical and life sciences is certainly attributable to the downsizing of organizations and to industrial restructuring. Yet since employment for chemists, agriculturists, and biologists has been more positive in these fields, one suspects that substitutions of professional for technologist positions may also be occurring. (Such substitutions would arise if the nature of the work becomes more complex or if credentials become more important.)

Within the architectural and engineering fields, the highest employment growth rates in both the 1970s and the 1980s were recorded by architects, electrical engineers, and mechanical engineers. Employment growth for technologists and technicians in these fields declined to approximately zero in the 1981-1986 period, compared to a robust 4 per cent per year in the 1970s. Behind this falloff is substantial variation in jobs among industries. Those that have contributed heavily to the decline in the number of positions for technologists and technicians include metal mines, primary metal producers, electrical utilities, business services, and government.

In contrast, the number of technologist and technician positions remained stable or increased in food and beverage and tobacco industries, in pulp and paper, in metal fabricating, in machinery and equipment, business machines, and electrical products industries, in motor vehicle and parts, and in construction. It is notable that the industries on the positive side are all in the goods-producing sector of the economy and most of them are in the "traded industries" category; that is, they are in product markets that involve intense international competition. Within these industries, architectural and engineering technologists and technicians became more, rather than less, important in staffing patterns (that is, their shares of total employment in these industries rose during the 1981-1986 period).

In general, the labour market situation for a number of professional and technologist occupations in the physical, life, and engineering sciences was somewhat rocky in the first six years of the 1980s. That instability may, in turn, have affected the supply side of the labour market, a development that can contribute to imbalances between demand and supply in the longer term. As will be seen in a later chapter, enrolments in university engineering programs began to decline after 1982. This falloff may have been a response to poor job prospects during the recession, but even though economic

recovery started after 1982, enrolments continued to decline in subsequent years. Similarly, enrolments in community college technology programs have moved downward every year from 1983 to 1988. Yet as economic expansion continued throughout this time period, serious shortages arose of engineers and technologists in a number of categories.

It appears young people may have developed a great deal of uncertainty about the career prospects in engineering and technology. This uncertainty has probably contributed to the decline in enrolments in these programs and in labour supply in these areas, leading to occupational shortages that Ontario's economy cannot afford.

Management-Support and Clerical and Related Occupations

Employment patterns in the management-support and clerical categories, which represent two different levels in the skill mix, have gone in opposite directions (see Table 7). For management-support occupations, such as lawyers, accountants and auditors, and personnel and purchasing officers, growth in jobs has been steady throughout the 1971-1986 period.

A very different pattern has emerged for clerical jobs. The application of microelectronic-computer-based technologies to information processing, the production of documents, and the communication of information has clearly reduced the demand for workers to undertake many of these functions. The need for typists, clerk-typists, and office machine operators has been declining since 1971. The 1981-1986 period saw slowed or negative employment growth in the following job categories: bookkeepers and accounting clerks; insurance, bank, and other finance clerks; statistical clerks; library and file clerks; personnel clerks; telephone operators; and messengers.

Employment did expand in the 1980s for certain clerical and related jobs. Some were those whose importance in staffing patterns has been increased by technological innovation; for example, electronic data-processing equipment operators. Others were favoured by market demand; for example, travel and hotel clerks and tellers and cashiers.

Processing, Machining, Fabricating, and Assembling Occupations

Jobs in processing, machining, fabricating, and assembling have been open to the influences of several factors. One of these has been the decline of some goods-producing industries in the face of competition from offshore producers. A more pervasive factor, however, has been technological innovation. With the diffusion into the workplace of new technologies such as numerical/computer-controlled (NC/CNC) machines, pick-and-place and other robots, programmable controllers, and automated sensor-based inspection or testing equipment, one would expect many jobs in these categories to be phased out. As shown in Table 8, this pattern emerged in the 1980s. Employment growth turned negative across a number of occupations that involve the processing, machining, shaping, and forming of various materials.

Table 7
Average Annual Employment Growth Rates
Selected Management Support
and Clerical and Related Occupations
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Management support			
Lawyers	6.0%	6.9%	4.4%
Accountants and auditors	4.2	4.2	4.4
Personnel and related officers	2.4	3.6	2.4
Purchasing and related	3.1	4.2	0.8
Product and interior designers	4.7	4.7	4.9
Economists	5.4	6.3	3.8
Clerical and related			
Secretaries and stenographers	3.1	3.5	2.4
Typists and clerk-typists	-3.9	-0.1	-11.4
Bookkeepers and accounting clerks	3.5	5.3	0.2
Tellers and cashiers	5.4	6.7	3.1
Insurance, bank, and other finance clerks	5.2	7.1	1.7
Statistical clerks	0.7	5.2	-7.5
Office machine operators	-4.2	-4.3	-4.3
Electronic data-processing equipment operators	9.4	10.5	7.4
Library and file clerks	0.5	1.9	-2.1
Receptionists and information clerks	5.6	6.3	4.3
Telephone operators	-1.1	0.7	-4.7
Messengers	-0.6	0.1	-1.9
Claim adjusters	6.0	4.1	10.1
Travel clerks and ticket, station, and freight agents	7.9	9.9	4.3
Hotel clerks	4.4	4.5	4.2
Personnel clerks	4.3	9.8	-5.9
General office clerks	2.8	2.5	3.3

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Table 8
Average Annual Employment Growth Rates
Selected Processing, Machining, Fabricating and Assembling Occupations
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Processing			
Mineral ore treating	-0.1%	4.2%	-8.1%
Metal processing	-0.2	5.1	-10.0
Clay, glass, and stone processing and forming	-0.7	0.4	-1.3
Chemical, petroleum, rubber, and plastics processing	1.0	3.1	-3.0
Food and beverage processing	2.2	2.9	0.8
Wood processing (except pulp and papermaking)	2.7	5.8	-3.3
Pulp and papermaking	0.7	3.2	-4.1
Textile processing	-1.5	0.9	-6.1
Inspect, test, grade and sample occupations related to processing	2.5	4.5	-1.5
Machining			
Metal machining, shaping, and forming	-2.8	-1.3	-5.9
Wood sawing, shaping, and machining	-3.0	-1.6	-5.6
Clay, glass and stone cutting, shaping, and polishing	1.5	3.4	-2.2
Inspect, test, grade and sample occupations related to machining	1.5	2.4	-0.3
Product fabricating and assembling			
Metal products	4.4	4.1	5.1
Electrical, electronic products	1.2	2.9	-2.2
Wood products	6.0	7.3	3.6
Textiles, fur, and leather products	1.7	2.6	0.0
Rubber and plastic products	3.5	4.8	0.8
Paper products	-2.0	-0.6	-4.8
Inspect, test, grade and sample occupations related to product fabricating and assembly	2.8	3.8	0.7
Labourers			
Labourers and other elemental work related to processing	3.0	2.2	4.6
Labourers and other elemental work related to product fabricating and assembly	2.0	-1.1	8.6

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Trends in product fabrication and assembly were much more mixed. Jobs in this category are, of course, open to the effects of productivity improvements as equipment and tools are improved and organizations implement changes in the distribution of responsibilities and tasks. But the scope for automating the actual fabrication and assembly of products from components is narrower. For example, constructing machinery, automobiles, airplanes, precision instruments, and the like still requires well-trained workers. Consequently, the key factors leading to growth or decline in many product fabrication and assembly jobs are changes in demand for products and the ability of domestic producers to maintain or increase their market shares in the face of competition from offshore producers.

Fabricating and assembling jobs in metal products and wood products experienced growth in both the 1971-1981 and 1981-1986 periods. On the other side of the ledger, jobs in electrical and electronic products and textile, fur, and leather products industries declined.

The number of jobs for labourers associated with processing, machining, and assembly work exhibited strong growth between 1981 and 1986. This finding indicates that some job substitution downward is occurring. Technological innovations result in the deskilling of some jobs in processing and machining; they are being moved into the labourers' category in industry staffing patterns.

Skilled Trades

Skilled trades are essential in the construction, maintenance, and repair of physical plant, machinery, and equipment. Although these occupations occupy a strategic role in the maintenance and expansion of the economy's productive capacity, the number of jobs in them, as in many other occupational groups, is also influenced by shifts in the demands for goods and services, industrial restructuring, and technological innovations.

A number of the trades shown in Table 9 are heavily concentrated in the manufacturing sector. Among these, jobs for tool and die makers and machine tool set-up operators have grown throughout the 1971-1986 period. So have jobs for electrical equipment installers and electronic equipment installers (with electronic equipment installers having the higher growth rates) and for cabinet and wood furniture makers and motor vehicle mechanics. In contrast, employment in forging and welding and flame-cutting occupations showed positive growth during the 1970s but negative growth in the 1981-1986 period. Boilermakers and platers have been in decline since 1971. As one would expect, rail transport equipment mechanics have been in decline since 1981. Industrial, farm, and construction machinery mechanics exhibited strong employment gains in the 1970s but no growth between 1981 and 1986, largely reflecting employment declines in metal mines, textiles, wood products, primary metal products, metal fabricating, and chemical products industries.

Among the other trades, carpenters and brick and stone masons and tile setters had the highest employment growth rates, especially in the 1981-1986 period – a time of strong expansion in Ontario's construction industry. Electricians have shown little employment growth, a situation that arises from two offsetting patterns: positive employment growth in construction but a decline in employment in manufacturing. The same offset explains the overall minimal employment gains for the plumbing and pipefitting trades.

Table 9
Average Annual Employment Growth Rates
Selected Skilled Trades
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Tool and die makers	2.2%	2.6%	1.4%
Machinists and machine set-up operators	1.4	1.1	2.1
Forging	–0.6	1.6	–4.8
Sheet metal workers	1.9	4.5	–3.0
Welding and flame cutting	1.5	3.2	–1.9
Boilermakers, platers, and structural metal workers	–2.0	–0.7	–4.8
Electrical equipment installing	4.9	6.4	2.0
Electronic equipment installing	9.3	11.1	6.2
Cabinet and wood furniture makers	5.7	6.6	3.9
Upholsterers	3.6	5.0	0.9
Motor vehicle mechanics	1.7	1.8	1.4
Aircraft mechanics	3.4	5.1	0.2
Rail transport equipment mechanics	–1.0	0.3	–3.7
Industrial, farm, and construction machine mechanics and repairmen	3.9	6.1	–0.1
Business and commercial machine mechanics	2.2	3.0	0.7
Electrical power linemen	2.1	3.8	–1.1
Electricians	–0.1	–0.4	0.4
Carpenters and related	1.6	0.7	3.4
Brick and stone masons and tile setters	1.2	0.2	3.4
Pipefitting, plumbing, and related	0.4	0.3	0.5
Structural metal erectors	0.6	2.8	–3.7

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Health Care, Teaching and Social Services

For almost all the occupations in health care, teaching, and social services, the trend was positive employment growth in both the 1970s and the 1980s (see Table 10). This finding is not surprising, since employment changes in these areas are driven by population dynamics and society's demands for health, education, and social services, rather than the vagaries of market demands for goods and competition in the international marketplace.

Although the general long-term trend has been positive, some variations require comment. Within health care services, the number of positions for nursing supervisors, assistants, aides, and orderlies declined after 1981. The decline in auxiliary nursing staff reflects substitution of nurses for lower-skilled workers with a consequent increase in the importance of nurses in the staffing patterns of hospitals.[13]

In education, changes over time in the number of positions at different levels of the system are governed principally by demographic trends and institutional factors that affect the educational system. A review of employment growth rates for teachers in the secondary and post-secondary educational systems clearly reveals that impact of demographics. During the 1970s, the post-war baby boomers completed high school and moved through the post-secondary colleges and universities. Consequently, demand for teachers at the secondary and post-secondary levels dropped off substantially after 1981. In contrast, as government and school boards placed greater emphasis on special educational services, employment growth for teachers of exceptional students, fine arts teachers, and educational and vocational counsellors remained strong in the 1981-1986 period.

The reality of a more complex society in which many individuals require various support services, at least from time to time, is reflected in the growth in the number of social workers. Employment for this occupation expanded more than 9 per cent per year over the whole fifteen-year period. Jobs in other welfare and community services also exhibited substantial growth.

Sales and Services Occupations

With few exceptions, growth in the trade and service industries has generated parallel growth in jobs (see Table 11). Employment in occupations related to sales of commodities (technical sales and other salespersons) and services (insurance, real estate, securities, advertising) has grown substantially in the 1970s and the 1980s. Two exceptions were commercial travellers and driver-salespersons.

Protective service occupations – fire-fighting, police, and guards – also posted positive growth rates between 1971 and 1986. Among jobs in the personal services category, chefs and cooks, bartenders, and waiters and waitresses had the highest growth rates. Next in order were bus drivers, taxi drivers, and chauffeurs.

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[13]Noah M. Meltz with Jill Marzetti, The Shortage of Registered Nurses: An Analysis in a Labour Market Context ([Toronto]: Registered Nurses Association of Ontario, 1988).

Table 10
Average Annual Employment Growth Rates
Selected Occupations in Health Care,
Teaching, and Social Services
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Health care			
Physicians and surgeons	3.2%	3.2%	3.4%
Dentists	3.7	4.2	2.7
Osteopaths, chiropractors, and health diagnosticians	8.4	9.1	7.1
Psychologists	4.9	4.8	5.2
Nursing supervisors	0.9	2.3	–1.9
Nurses	4.5	4.2	5.3
Nursing assistants	–1.3	1.0	–5.9
Nursing aides and orderlies	–2.1	0.8	–7.8
Physiotherapists	6.1	6.0	6.5
Pharmacists	3.9	4.2	3.6
Optometrists	3.3	3.1	3.6
Dispensing opticians	6.8	8.5	3.5
Radiological technologists and technicians	2.2	2.6	1.5
Medical laboratory technologists and technicians	4.9	6.1	2.8
Dental hygienists, assistants, and technicians	5.6	6.6	3.9
Teaching			
Educational and vocational counsellors	3.1	2.1	5.3
University teachers	1.8	2.5	0.6
Elementary and kindergarten teachers	1.5	1.6	1.4
Secondary school teachers	1.4	1.9	0.3
Occupations related to teaching in elementary and secondary schools	5.5	3.8	9.2
Community college and vocational school teachers	7.6	11.1	1.2
Fine arts school teachers	2.8	3.0	2.5
Teachers of exceptional students	9.2	12.9	2.3
Social services			
Social workers	9.4	9.6	9.3
Occupations in welfare and community services	7.4	9.3	3.8

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Table 11
Average Annual Employment Growth Rates
Selected Occupations in Sales and Services
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Commodity Sales			
Technical salesmen and related advisers	8.2%	6.7%	11.7%
Commercial travellers	2.6	6.7	–5.2
Salespersons	3.6	3.5	4.0
Service station attendants	0.3	–0.1	1.0
Driver-salesmen	–4.8	–5.5	–3.5
Service Sales			
Insurance salesmen and agents	3.1	3.8	1.8
Real estate salesmen	6.7	7.8	4.9
Securities salesmen and traders	3.6	4.4	2.2
Advertising salesmen	5.0	5.8	3.7
Protective services			
Fire-fighters	2.3	2.6	1.7
Police, detectives, and investigators	2.0	3.0	–0.1
Guards and watchmen	3.9	4.7	2.4
Personal services			
Chefs and cooks	5.9	6.9	4.3
Bartenders	7.2	8.7	4.5
Waiters, waitresses, and related (food and beverage)	4.7	5.9	2.2
Barbers, hairdressers, and related	2.2	1.2	4.4
Laundering, dry cleaning, and pressing	1.0	1.1	0.8
Bus drivers, taxi drivers, and chauffeurs	3.7	4.1	3.1
Janitors, cleaners, and chambermaids	1.3	2.1	–0.3

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Artistic and Literary Occupations

Employment in artistic and literary occupations has grown in importance in the past fifteen years (see Table 12). This pattern is attributable to a number of influences. As society's wealth, educational attainment, and leisure time increase, the demand for the products and services of artists, painters, sculptors, writers, actors, and musicians increases. With the expansion of the communications industry and marketing and advertising activities, employment for writers, editors, announcers, and advertising and illustrating artists has also expanded.

Table 12
Average Annual Employment Growth Rates
Selected Artistic and Literary Occupations
Ontario, 1971-1986

Occupation	1971 to 1986	1971 to 1981	1981 to 1986
Painters, sculptors, and related artists	9.6%	13.5%	2.6%
Advertising and illustrating artists	6.9	7.5	5.8
Photographers and cameramen	4.9	4.9	5.0
Producers, directors, performing and audiovisual	7.9	8.8	6.5
Musicians	2.6	5.2	-2.2
Actors, dancers, and choreographers	10.6	13.2	5.6
Radio and television announcers	6.9	8.4	4.2
Writers and editors	5.3	6.4	3.3

Source: Statistics Canada, Census, 1971, 1981 and 1986.

Summary

Ontario's labour market became a very turbulent one in the 1980s. The generally stable and positive trends, by industry and by occupation, that were observed in the 1970s have been replaced in many cases by much more uneven employment patterns, accelerating shifts in the occupational structure of the economy. The factors contributing to this development include a rapid pace of industrial restructuring in response to declining tariff protection, productivity improvements, technological innovations in the workplace, and changes in the distribution of final demands for goods and services.

On balance, the changes in employment patterns have shifted the job mix so as to place a higher premium on knowledge workers. Managerial positions, professional and technical jobs, and employment in artistic and literary occupations have exhibited positive employment growth rates, while jobs for first-line supervisors and semiskilled workers in processing, machining, and routine clerical work have been declining.

Employment in a number of semiskilled job categories in the service sector, – salespersons, bartenders, waiters/waitresses, bus and taxi drivers – has, of course, expanded. It should be noted, however, that the growth of the service-sector industries has also meant growth in jobs that require higher levels of education and training – technical sales jobs; sales positions in insurance, real estate and securities; jobs in advertising; and positions in health care.

Many of the trends and shifts in employment patterns from the 1971-1986 period are expected to continue throughout the next decade. As noted earlier, the current Uruguay Round of GATT negotiations to reduce barriers to international trade and the implementation of the Canada-United States Free Trade Agreement will unleash more intense competition, leading to further industrial restructuring and to increased diffusion of technological innovations as firms seek to improve productivity and product quality and to trade up to the manufacture of more sophisticated, higher value added products. In addition, employment in the service sector is expected to continue to expand. All of these factors will continue to influence changes in the economy's job mix throughout the next decade.

CHAPTER 4

Projection of Trends in the Job Mix to the Year 2000

This chapter offers a forecast of trends in the job mix of Ontario's economy to the end of the century. The projections are presented both for industry sectors and for occupational groups, and their implications are assessed.

Some caveats are in order. Whether particular types of jobs increase or decrease in importance in the economy depends on the influence of many variables, including advances in knowledge and technology, economic growth, international trade patterns and industrial restructuring, innovations in the workplace, and changes in the distribution of demands for goods and services. In light of this diverse set of factors, some of which are very volatile from time to time, it is an understatement to say that it is a difficult task to make precise projections of employment across occupations.

Further, as the time horizon of the projection lengthens and as the job categories of interest become more specific, higher error rates become inevitable and the utility of the exercise diminishes. Therefore, the projection period ends at the year 2000, and results are presented only for job families (clusters of related jobs), rather than for very specific job categories.

Despite these caveats and constraints, the projection results provide valuable insights into fundamental shifts in the occupational mix to be expected in the years ahead. Such information can be useful for counselling people about the evolving nature of the job market and on the best way of preparing themselves for the world of work. In addition, insights into future trends in labour demand assist long-term strategic planning to position education and training resources in both the public and private sectors.

Developing the Projections[14]

The first step in projecting employment by occupation involves a forecast of employment by industry sector. Future employment levels for industry sectors were estimated by using the FOCUS-PRISM[15] forecasting models developed by the Institute for Policy Analysis at the University of Toronto.

The next step in the exercise is to develop a projection of employment by occupation across industry sectors. This was accomplished in two stages. In the first, employment growth by occupation was reviewed for the 1971-1986 period as well as the 1971-1981 and 1981-1986 subperiods by industry. From this analysis, occupations were categorized into two groups: those with little change in staffing patterns and those with a significant change in the pattern. For those in the latter category, variations in staffing patterns by industry sector were analyzed in detail.

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[14]A much fuller description of the methodology used is provided in Appendix A.

[15]FOCUS is a model of the Canadian economy that generates projections of economic variables at the national level. The results from FOCUS are then used in the PRISM model to produce a forecast of output and employment by industry sector for the Ontario economy. For additional background on these models, see Appendix A.

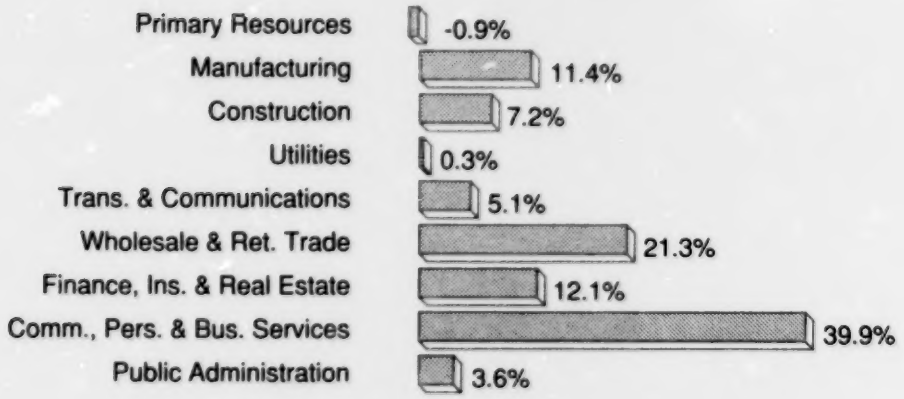
From these analyses plus comparisons with trends for the Canadian economy and in the United States, estimates of future staffing patterns for industries (percentage distributions of employment by occupation) were developed. By applying these staffing patterns to the forecast levels of industry employment, future estimates of employment by occupation were derived.

It should be noted that separate projections were prepared for occupations in education and in health care. The demand for teachers and related occupations is determined primarily by demographic trends and institutional arrangements (such as student-teacher ratios). Thus, employment growth in these occupations should be projected separately because they are not directly dependent on economic growth patterns. Similarly, employment growth in health care occupations is driven in large part by population dynamics (changes in the growth and age structure of the population) that affect the demand for health care services. The results from these two separate projections were used in estimating the future distribution of employment by occupation.

Future Industry Employment Patterns

Many of the interindustry employment trends described in Chapters 2 and 3 are expected to continue throughout the 1990s. The main source of job creation will be the service industries. Taken together, the wholesale and retail trade, finance, insurance, and real estate, public administration and community, personal, and business services will account for more than three-quarters of the new jobs in the economy (see Chart 4). In contrast, manufacturing, construction, utilities, and the transportation and communications industries will make modest contributions to job creation, and moderate declines in employment are projected for agriculture and the other primary resource industries.

Chart 4
Contribution by Industry to Projected Employment Growth, Ontario, 1986-2000



Source: Estimated by using FOCUS/PRISM models, the Institute for Policy Analysis, University of Toronto.

Consequently, the distribution of jobs will shift dramatically towards the tertiary sector of the economy. By the year 2000, the share of total employment in service industries will be approximately 70.7 per cent, up from 67.2 per cent in 1986 (see Chart 5).

This marked shift towards service industries will involve job growth at both the lower and higher levels of the skills spectrum. There will certainly be an increase in the number of traditional service jobs, such as salespersons and food and beverage servers. There will also be substantial growth in the managerial, professional, and technical jobs that require advanced levels of education and training. Growth in these jobs will be especially striking because of the significant contributions to job creation that will be made by finance, insurance, and real estate services, health services, and business services. Health services and financial, insurance, and real estate services will each contribute 16 per cent of employment growth in the 1990s, while business services will account for 11 per cent.

Chart 5
Shares of Employment, Goods and Service Producing Sectors, Ontario, 1986-2000

Source: Estimated by using FOCUS-PRISM models, the Institute for Policy Analysis, University of Toronto.

Projections of Occupational Employment Growth

In analysing occupational employment projections, it is wise to emphasize trends, rather than absolute estimates. That approach is used here for clusters of related jobs. Estimated annual average rates of employment growth and contribution to job creation by occupational group are shown in Table 13 for the forecast period.

Table 13
Projections of Employment Growth for Selected Occupations Ontario, 1986-2000

Occupation	Average annual rate of growth	Percentage contribution to total employment growth
Managerial and supervisory	2.5%	18.3%
Managers	3.2	14.6
Supervisors	1.3	3.7
Professional and technical (excluding health care and teaching)	3.3	19.5
Health care	2.5	6.1
Professional and technical	2.9	6.4
Other health care	–1.0	–0.2
Teaching	1.6	3.3
Clerical and related	1.9	17.0
Sales	2.7	11.4
Services	2.0	8.5
Skilled trades	2.2	11.7
Processing	1.1	1.4
Materials	0.4	0.2
Food and beverage	1.7	0.8
Labourers and related	1.6	0.4
Machining	–0.2	–0.1
Metal	–0.6	–0.1
Wood machining	–0.5	0.0
Other materials	0.9	0.1
Product fabricating, assembling	0.9	2.2
Transportation equipment operating	1.3	1.9
Material handling and related	1.1	1.0
Other crafts and equipment operating	2.0	1.6
Primary resources occupations	–0.5	–0.7

Source: Labour Market Research Group, Ministry of Skills Development.

Most of the occupations that will have above-average growth rates will be those in the managerial, professional and technical, and skilled trades categories, job families that generally require postsecondary education and training. Exceptions to this will be jobs in sales and service, which will grow quickly as expansion in the retail trade and personal service industries continues. Employment in product fabricating and assembling, transportation equipment operating, and materials handling is also projected to expand, but jobs in these categories will increase at less than the overall rate of job creation. Growth in processing and machining jobs will be well below average.

On balance, the mix of jobs in Ontario will shift further towards those that require higher-skill levels. In total, managerial, professional and technical in science, engineering, health care and teaching, and skilled trades jobs will account for more than half (55 per cent) of total forecast employment growth to the end of the century.

Within the managerial category, jobs for managers in health care, personnel and industrial relations, finance, and sales and advertising are projected to have the highest growth rates. The demand for first-line supervisors will be considerably weaker except for positions in sales and service and in food and beverage preparation.

Among the large array of professional and technical jobs in the economy, opportunities for systems analysts and programmers will expand the most rapidly. The next highest growth rates will be for social workers and others in community and welfare work and for professional and technical jobs in health care – nurses, therapists, technologists, and technicians.

In the scientific and engineering fields, architects and electrical and industrial engineers are expected to have the most job opportunities. Positive employment growth for technologists and technicians in these areas is also forecast.

Given the current demographic trends, the fastest expansion in the educational system will be jobs for vocational and educational counsellors, and elementary and secondary school teachers. Jobs for college and university teachers will grow at a very slow pace in the 1990s. As will be explained in the next chapter, however, replacement needs attributable to retirements will be high for college and university teachers in the next decade.

In the clerical and related group, employment will expand for some job categories and decline for others. Those with above-average employment growth rates will be travel clerks, hotel clerks, tellers and cashiers, and electronic data-processing equipment operators. On the down side, clerk-typists, statistical clerks, office machine operators, and file clerks will continue to decline in importance.

As already noted, jobs in sales will expand as the trade sector of the economy grows. Within this broad occupational group, positions for technical salespersons and job in real estate and advertising sales are predicted to have the highest growth rates.

Jobs in the service category will also expand with some variations around the overall trend. The occupations with the highest projected growth rates are food and beverage serving and child care. Jobs in protective service occupations – fire-fighters, police officers, and guards and other security jobs – are projected to increase, but the rate of growth will not be above average.

Within the skilled trades, electronic equipment installers and repairers, wire communication equipment installers, electrical equipment installers and repairers, chefs and cooks, and cabinet and wood furniture makers are expected to have the highest rates of job growth. For other skilled trades, such as brick and stone masons and tile setters, plumbers, carpenters, and business and commercial machine mechanics, employment is projected to increase at a rate close to the overall growth rate for skilled trades jobs.

For processing and machining jobs in the goods-producing industries, the trends that emerged in the 1980s are expected to continue in the next decade. Little growth is expected in processing jobs, and those in machining are projected to decline. Exceptions are jobs in food processing and jobs for labourers in the entire processing category.

Job opportunities are expected to expand in product fabricating and assembling, transportation equipment operating, and materials handling. The rates of growth will, however, be very moderate. Meanwhile, the number of jobs in agriculture, horticulture, forestry, and mining will decline. Again, there are exceptions to the general trend; two of them are jobs for nursery workers and jobs in forestry conservation.

Implications for Education and Training and Labour Adjustment

These future trends in the jobs mix have major implications for the educational attainment and training levels of the work force. As the occupational mix continues to shift towards managerial, administrative, professional and technical positions, both the basic and technical skill levels of the work force must rise. The relationship between occupation and education and training is shown in Chart 6. The proportions of individuals employed in managerial, professional, and technical categories who have education and training beyond the secondary level are very substantial. Even if one were to make the artificial – and surely false – assumption that there will be no increase in the complexity and skill requirements of jobs, the increase in the importance of higher-skilled jobs in the years ahead will shift the demand for workers towards those with more advanced levels of education and training.

The forecasts presented here also signal that the shortages of high skilled workers now being encountered by employers will persist in the 1990s. Difficulties in recruiting secondary school teachers and qualified workers for professional and technologist jobs in health care are generating considerable interest. Firms in other sectors of the economy are encountering problems in hiring qualified personnel in areas such as software engineering, computer assisted design, automated manufacturing, accounting, engineering, computer programming, and systems analysis.[16] Statistics Canada has reported that 41 per cent of manufacturing establishments in the Canadian economy are experiencing some problems in hiring skilled personnel to work with the new technologies being introduced into the workplace, and more than a quarter (28 per

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[16]Technical Services Council, "Candidates Choosey as Jobs for Professionals Increase," Quarterly Release, first quarter 1988, Toronto.

cent) are experiencing very difficult recruitment problems.[17] As well, there are shortages of qualified workers to fill jobs in the skilled construction trades.[18]

As jobs become more complex when firms introduce new technologies or implement changes in the organization of work, deficiencies in workers' basic skills will become evident. This discovery will not be unexpected given the substantial proportions of current workers in processing, machining, fabrication and assembly, and materials handling jobs who have less than a secondary school education (see Chart 6). Indeed, a recent Conference Board of Canada survey reveals that employers are already encountering problems because their employees' basic skills are inadequate.[19]

For this survey, the Board used the following definition for literacy and numeracy:

"The ability to read, write and perform basic math at a level which enables an individual to function independently in the community, including carrying out work responsibilities and undertaking operational training in a satisfactory manner".

The researchers found that firms encountered difficulties with employees' literacy and numeracy when it came to:

Area	Percentage of firms reporting difficulties
Transfers	40%
New assignments	40
Training	38
Productivity	32
Completion of assignments	32
Introduction of new technology	31
Product quality	27

In the years ahead, as jobs in processing, machining and product fabrication, and assembly continue to be affected by both technological innovations and industrial restructuring, Ontario is bound to experience intense labour adjustment problems. Most of these jobs are semiskilled in nature, a fact reflected in the large proportions of workers in them who have low levels of education. As these jobs decline in importance, some workers will have to take new assignments with their employers and others will find themselves unemployed. Many of those who stay with their employers will have to upgrade their basic skills – not an easy adjustment for workers who have had long years of service in very specific jobs and for whom learning the three Rs is but a very distant memory. Those who are let go will find it increasingly difficult to find alternative employment in similar types of jobs, and for many the labour market adjustment costs

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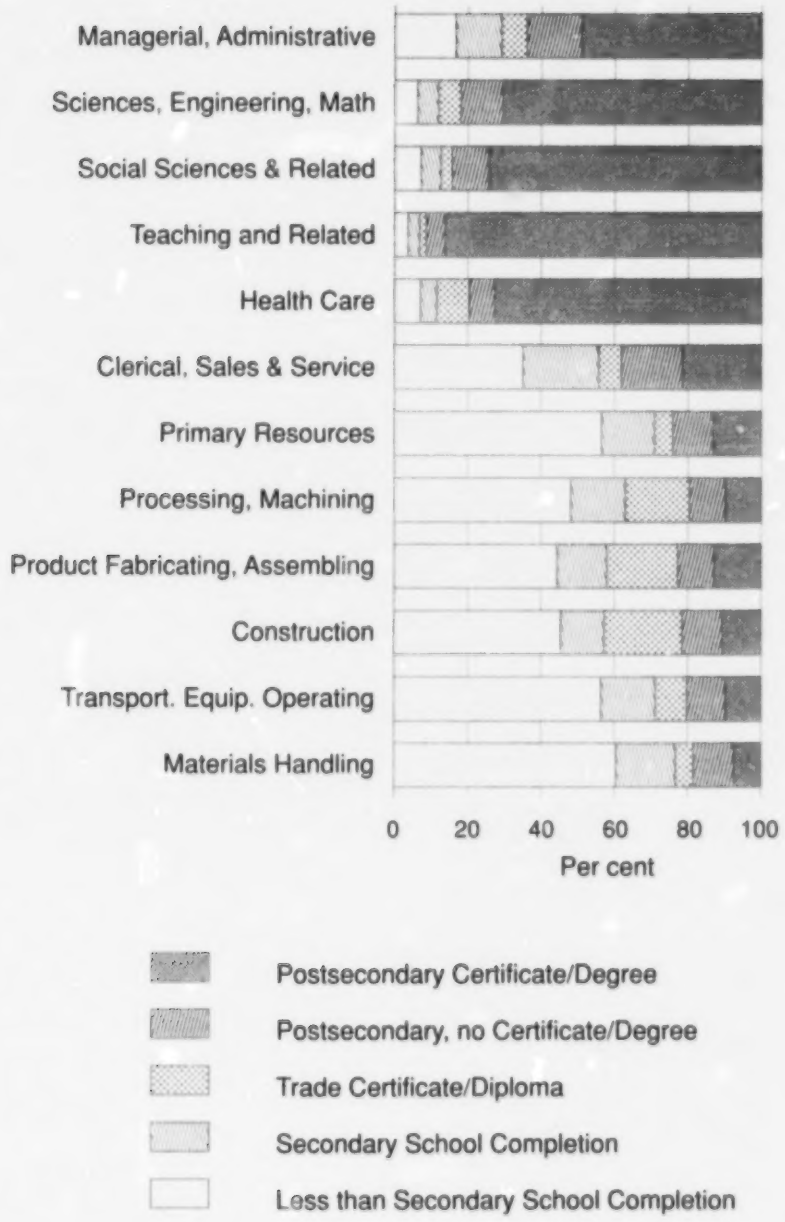
[17]Statistics Canada, Survey of Manufacturing Technology, March 1989.

[18]Ontario, Ministry of Skills Development, Labour Market Characteristics of Workers in Six Construction Trades, (Toronto: October 1989).

[19]Bob Des Lauriers, "Functional Literacy in Canadian Business," Canadian Business Review, (Conference Board of Canada) 16, no. 4 (Winter 1989).

Chart 6
Distribution of the Labour Force by Education by Occupation, Ontario, 1986



Source: Statistics Canada, Census data.

will be high – long-periods of unemployment, loss of earnings, and the attendant psychic costs. For them, one option will be to qualify themselves for other types of jobs; to do so, they will need assistance in both upgrading their basic skills and applying them to new tasks.

Summary

The projections presented in this chapter provide a number of insights into the future demand side of the labour market. The largest source of new jobs in the 1990s will be the service sector. The personal service industries will contribute the most, but there will also be marked employed growth in finance, insurance, and real estate, in health services, in education services, in communications, and in business services.

The job market of the 1990s will be characterized by a continued and marked shift of the occupational mix from lower – to higher-skilled jobs. To meet the demands of the workplace, the educational attainment and training levels of the labour force will have to improve. Otherwise, the shortages of qualified workers for a variety of professional and technical jobs that emerged in the 1980s will become more severe in the 1990s. Further, as firms introduce new technologies to produce goods and services they are discovering too frequently that their workers cannot adjust because they lack basic skills. Programs to upgrade employees' skills have become and will continue to be a high priority. For many workers who lose their jobs when production processes are automated or industries restructure, basic skills upgrading will also be essential. Without it, they will find it increasingly difficult to qualify for other jobs.

CHAPTER 5

Trends on the Supply Side of the Labour Market

Changes from one decade to another in an economy's rate of labour supply growth, work force characteristics, and retirement patterns can have serious implications for employers' human resource development and management policies and practices. A critical question is whether or not members of the work force will be sufficiently educated and trained to meet future shifts in the job mix. If a mismatch occurs, structural imbalances will arise between supply and demand, imbalances that can impose real constraints on the economy's capacity to adjust and expand. Growth in output and employment will be forgone.

As will be seen later in this chapter, the growth rate of Ontario's labour supply in the 1990s will be much lower than in previous decades. Labour shortage, rather than labour surplus, will characterize the province's labour market. The job mix of the future – the one outlined in the last chapter – will require that an increasing proportion of the labour force be quite highly skilled. Further, the work force will be ageing, and retirements and thus replacement needs will be above average in a number of occupational groups that require advanced levels of education and training. For high-skill knowledge workers in engineering and technology, recent patterns of enrolments in education and training programs suggest that supply may not be adequate to meet demand – a particularly disconcerting finding.

Labour Supply Growth and Demographic Characteristics of the Work Force

Labour supply growth depends primarily on population dynamics[20] and trends in the proportions of various age-sex groups who participate in the labour force. As shown in Chart 7, Ontario's labour force growth declined from a high of 3.2 per cent per year in the 1970s to 2 per cent in the 1980s and is projected to grow by 1.5 per cent in the 1990s. Underlying these changes from decade to decade are variations in demographic and labour force participation patterns.

The 1970s were characterized by high labour supply growth for two reasons: first, a large number of post-war baby boomers completed their education and entered the work force during that decade; and second, women continued their trend of increased labour force participation. During the 1980s, however, a fundamental change began. Although the rise in the female labour force participation rate continued, the number of young persons (15– to 24-year-olds) moving into the work force began to decline as the large baby boom cohorts were replaced by much smaller groups of young people. The latter factor, which will have a substantial influence throughout the 1990s, is associated with the drop in the birth rate after the baby boom. In the 1970s, the number of 15– to 24-year-olds in Ontario's labour force increased by 378,000, but during the 1980s it is estimated to have declined by 69,000. On average, between 1990 and the year 2000 there will be zero growth in the number of young people in the labour force. Given current demographic trends, their number will begin to pick up only towards the end of the 1990s.

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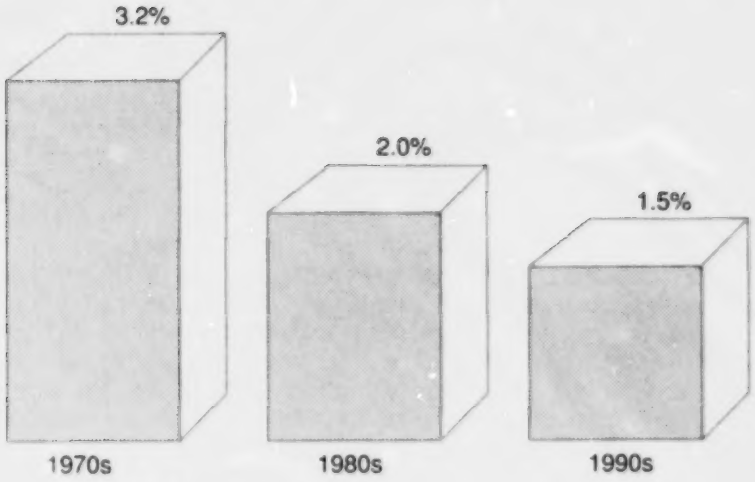
[20]The analysis of demographic trends presented in this section draws on "Ontario Population Projections to 2001," Demographic Bulletin, Demographics and Social Economics Branch, Ministry of Treasury and Economics, January 1989.

Chart 7
Annual Labour Force Growth Rates,
Ontario, 1970s to 1990s



Source: The labour force growth rate for the 1970s is based on data from Statistics Canada's Labour Force Survey; estimates for the 1980s and 1990s prepared by Labour Market Research Group, Ministry of Skills Development.

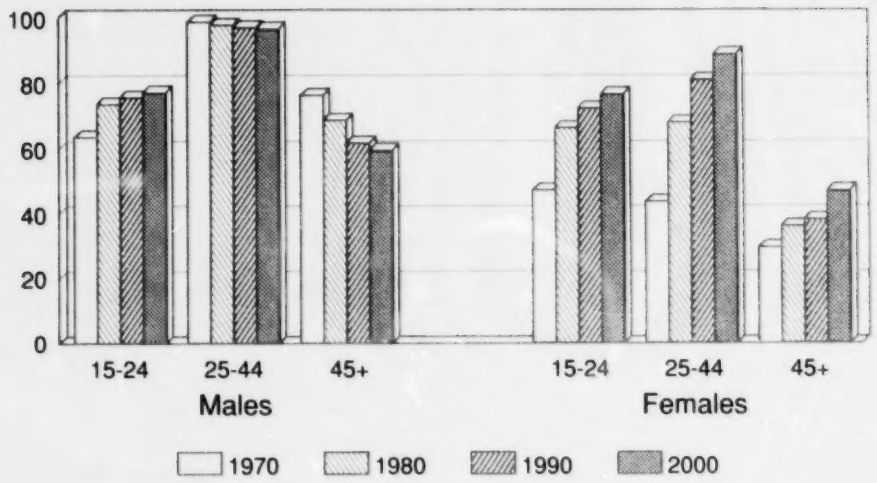
Chart 8 reveals that the expected trends for participation in the labour force are quite different for men and women. For females, a continued increase, based on the following scenario, is projected:

- The labour force participation rate of married women ages 25 to 44 increases throughout the 1990s. This forecast assumes that a variety of social and economic factors continue to operate, including having fewer children, higher educational attainment levels, expanding employment and career advancement opportunities, and a family standard of living and lifestyle that requires two income earners.

- Older women (ages 45 to 54 and 55 to 64) will show an above-average increase in their participation rates. The reason for this expectation is that the women who will be moving into these cohorts during the projection period have stronger attachments to the labour force than many of the women who have been in them during the past two decades.

Among older males, the long-term trend towards earlier retirement and the decline in their labour force participation rate are expected to continue, but at a more moderate rate than in the past. This projection is based on the expectation that slower labour force growth and a general labour shortage in the next decade will lead many employers to initiate policies to encourage experienced workers who have the retirement option to remain in the work force, offering them part-time positions with flexible-hours schedules.

Chart 8
Labour Force Participation Rates by Sex and Age, Ontario, 1970-2000

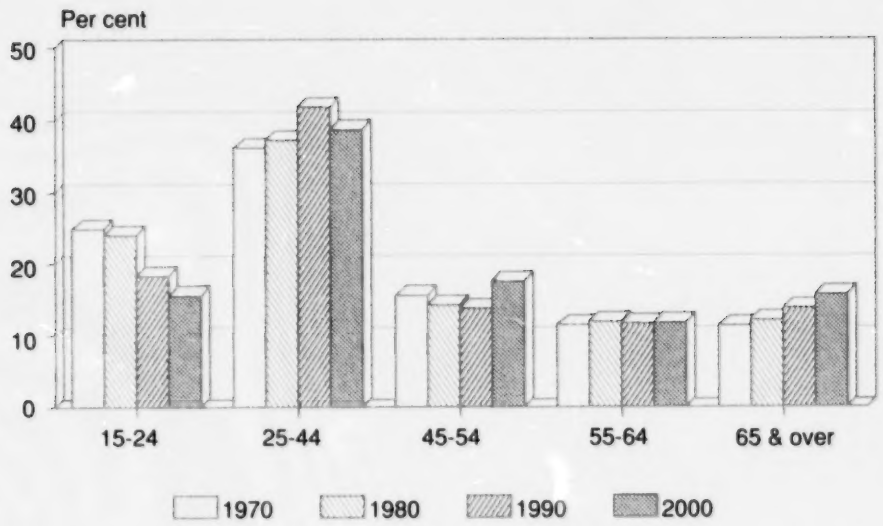


Source: The labour force participation rates for 1970 and 1980 are based on data from Statistics Canada's Labour Force Survey; estimates for 1990 and 2000 prepared by Labour Market Research Group, Ministry of Skills Development.

For young people (15– to 24-year-olds), labour force participation rates are projected to rise during the 1990s because of a combination of two factors. First, part-time jobs for students are expected to increase because of growth in the service sector. Second, a general labour shortage will cause employers to intensify their efforts to recruit students for part-time positions.

In brief, demographic trends rooted in past events will continue, and they will reduce labour supply growth in the 1990s. Moreover, as the baby boomers move from younger age cohorts into older ones, they will be replaced by much smaller groups of young people with a consequent ageing of the labour force source population. Chart 9 reveals this phenomenon by giving snapshots of the age structure of this population in four decade years. In 1970, 15– to 24-years-olds accounted for one-quarter of the total labour force source population; by the year 2000, their share is projected to decline to approximately 16 per cent. The share of 25– to 44-year-olds will peak in 1990. This pattern will continue beyond the millennium into the first decade of the next century. Only 11 years from now, people 55 to 64 years old will be the fastest growing component of Ontario's population.

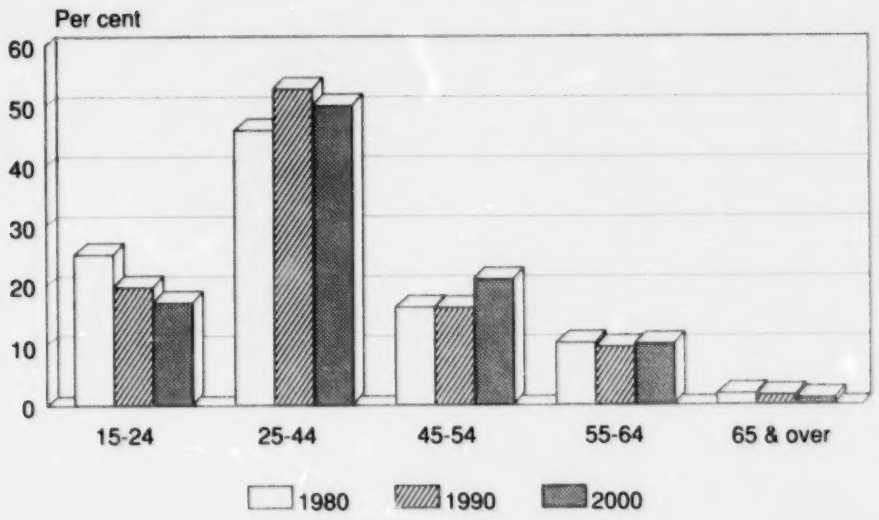
Chart 9
Age Structure of Source Population
Ontario, 1970-2000



Source: The age structure of source population for 1970 and 1980 is based on data from Statistics Canada's Labour Force Survey; estimates for 1990 and 2000 based on "Ontario Population Projections to 2001", Demographic Bulletin, Demographics and Social Economics Branch, Ministry of Treasury and Economics, January 1989.

In concert with the projected trends in participation rates, these population dynamics will bring about marked changes in the characteristics of Ontario's labour force in the next decade (Chart 10). The fastest growing group will be 45– to 54-year-olds, whose share of the total labour force will increase from about 16 to 21 per cent between 1990 and the year 2000. In contrast, the shares of both 15– to 24-year-olds and 25– to 44-year-olds will decline over the next decade.

Chart 10
Age Composition of the Labour Force,
Ontario, 1980-2000

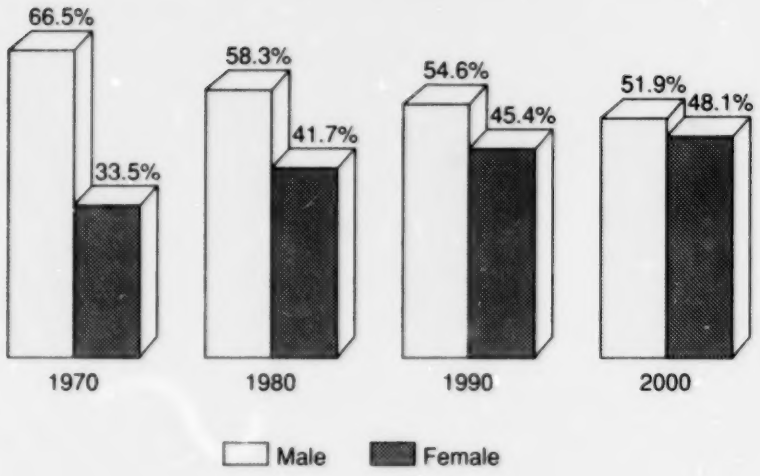


Source: The age composition of the labour force for 1980 is based on data from Statistics Canada's Labour Force Survey; estimates for 1990 and 2000 prepared by Labour Market Research Group, Ministry of Skills Development.

Women will account for approximately two-thirds of total labour supply growth between 1990 and the year 2000. By the end of the next decade, their share of the labour force will be 48 per cent (Chart 11).

In all, the supply side of the labour market in the 1990s and the first decade of the next century will differ considerably from that of past years. It will be a period of labour shortage, rather than labour surplus; workers will be much older on average; and women will account for close to half of the labour force. Given this labour market environment, employers should be taking a hard look at their present recruitment, human resource development, and management policies and practices and be implementing strategic adjustments to maintain the quality work forces they require.

Chart 11
Male-Female Composition of the Labour Force, Ontario, 1970-2000

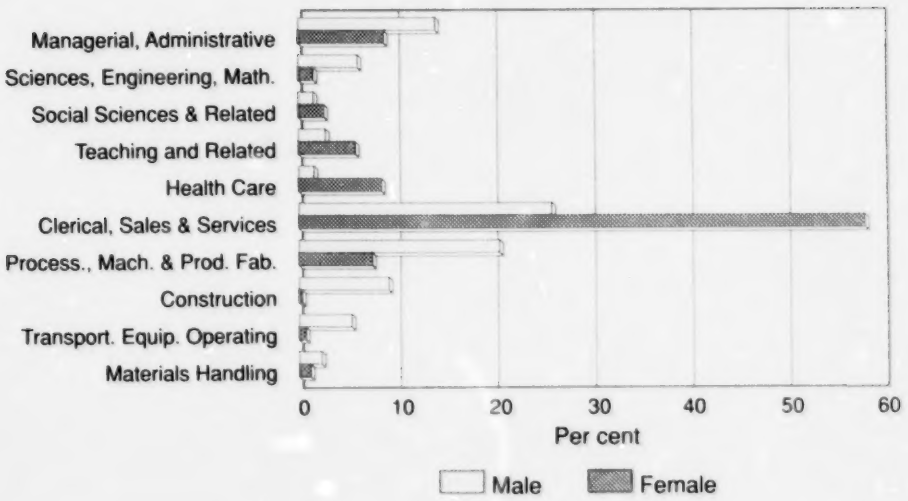


Source: Male-female composition of the labour force for 1970 and 1980 are based on data from Statistics Canada's Labour Force Survey; estimates for 1990 and 2000 prepared by Labour Market Research Group, Ministry of Skills Development.

One adjustment open to employers is to provide persons in the work force who are being underutilized relative to the potential they possess with more opportunities to advance into higher level and more responsible positions in organizations. On this point, women are a prime example. They have educational attainment levels equal to or better than those of men. According to 1986 census data, 32 per cent of women in Ontario's work force had completed a postsecondary certificate or degree program compared to 28 per cent for men.

There is a sizeable disparity, however, between the types of jobs typically held by women and by men. Close to 60 per cent of all employed women are found in clerical, sales, and service jobs. Men considerably outnumber women in managerial and administrative positions, in the natural sciences, engineering, and mathematics, and in the skilled trades, as well as in several other occupational categories (Chart 12). To circumvent labour shortages and maintain high quality work forces, one option open to employers is to provide women with more opportunities for upward mobility in organizations and to move into technical areas.

Chart 12
Distribution of Employed Males and Females by Occupation, Ontario, 1986



Source: Statistics Canada, Census data.

Retirements and Replacement Needs Across Occupations

With an ageing work force, retirements rise, so the need to replace qualified and experienced workers requires increased attention. From the 1980s to the 1990s, the overall rate of labour force withdrawal attributable to retirement and death will increase by an estimated two percentage points, from approximately 17 to 19 per cent. Following will come an even sharper rise in the first decade of the next century, when 55– to 64-year-olds will be the fastest growing group in the labour force. These developments, especially when coupled with slow labour supply growth, will compound employers' recruitment problems.

During the decade immediately ahead, retirement and replacement needs will be especially high in a number of occupations, either because they now have an above-average proportion of older workers (Chart 13) or because they include such a large number of workers that retirement and replacement needs are bound to be large (Chart 14) over a ten-year period.[21] The range of jobs in these two categories is considerable.

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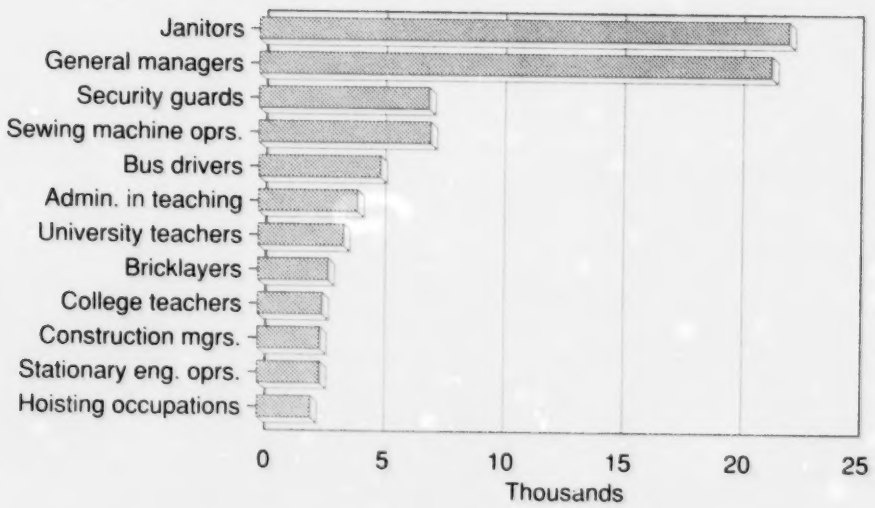
[21]Replacement needs are defined here as those attributable to age related retirements and deaths. They do not take into account replacement needs arising from occupational mobility. For a description of the methodology used to estimate labour force withdrawals and replacement needs, see Appendix B.

Chart 13
Selected Occupations with Replacement Needs 25% or More in the 1990s, Ontario



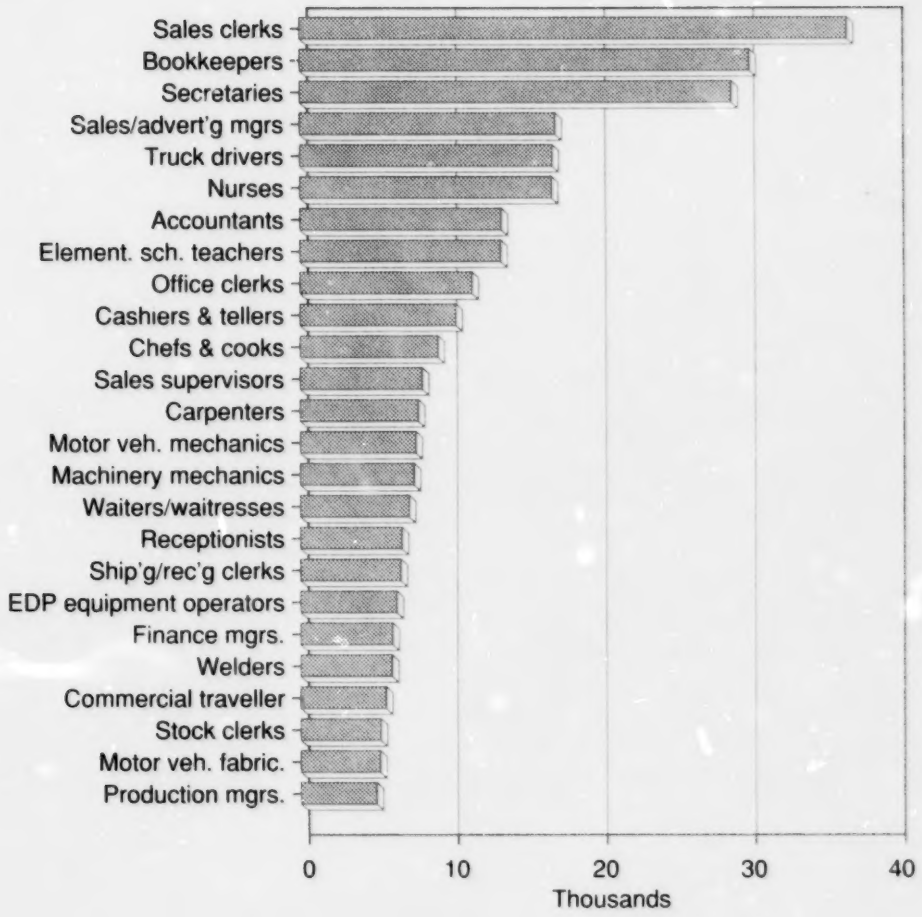
Source: Estimated based on Statistics Canada's 1986 Census data.

In the first group, they range from general managers to university and college teachers to janitors and bus drivers. Those in the second category, high replacement needs because of the large number of persons employed, are also found at different levels in the skills spectrum – various types of managers, accountants, and auditors, elementary school teachers, chefs and cooks, clerks and food and beverage serving occupations.

Trends in Sources of Supply of High-Skill Knowledge Workers

Many of the occupations listed in Charts 13 and 14 are in the managerial, professional, and technical job categories – the very categories expected to have the strongest growth rates in the economy during the years ahead. The labour market, fuelled by a combination of economic growth, technological innovations, and replacement needs, will exhibit strong demand for people with higher levels of education and training throughout the next decade. Such a finding is not unexpected. The analysis of historical and future trends in the occupational mix of Ontario's economy presented in Chapters 3 and 4 makes it evident that economic advances bring about changes in the nature of work that shift the demand for labour increasingly towards knowledge workers. A basic question is thus whether or not members of the labour force will have the knowledge and skills to match the requirements of the job mix. The answer will depend heavily on the education and training levels of new entrants to the labour force.

Chart 14
Selected Occupations with Replacement Needs 5000 or More in the 1990s, Ontario



Source: Estimated based on Statistics Canada's 1986 Census data.

This issue is explored here in a very broad fashion only by examining four major sources of people entering the labour market who have advanced levels of education and training: Ontario's community colleges; Ontario's universities; Ontario's apprenticeship training programs; and immigration to Ontario from other countries.[22]

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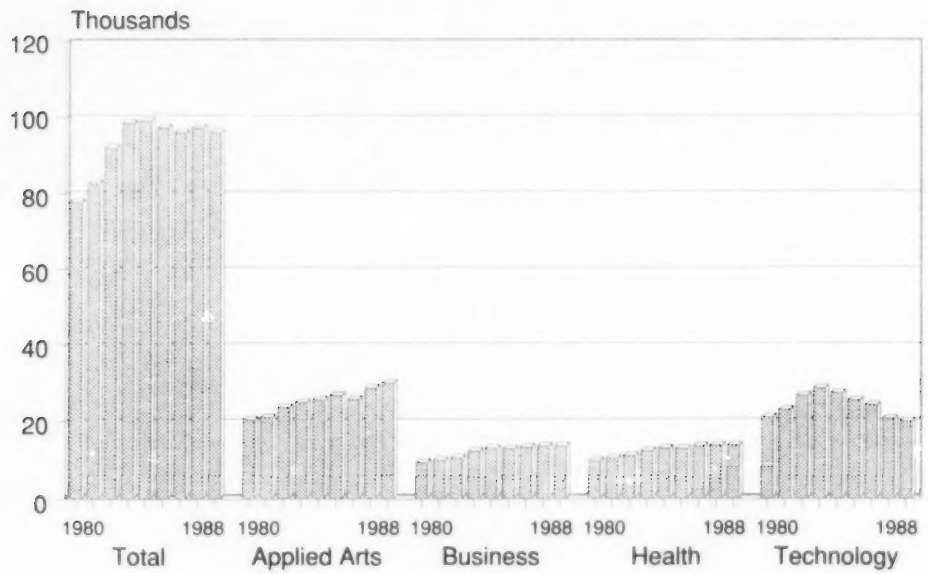
[22]Notice that this review does not deal with persons reentering the work force or migrating to Ontario from other regions of Canada. There is little precise information available on the jobs filled by individuals reentering the work force. Interregional migration is declining in importance as a source of labour supply for Ontario.

The Community Colleges

Ontario's Colleges of Applied Arts and Technology are an important source of new workers for jobs in the economy that require postsecondary levels of education and training. In addition, the colleges' continuing education programs provide a wide array of opportunities for people already in the labour market to expand or upgrade their knowledge and skills. Because of data limitations, however, the analysis here is restricted to full time students in Ontario's 22 community colleges.

Overall, full-time student enrolments rose during the first part of the 1980s and then declined after 1984 (Chart 15). At first glance, one might conclude that this decline was attributable to the shrinking of the potential student base as the number of young people completing their secondary school education diminished with the passing of the large baby boom cohorts into older age groups. A more detailed examination reveals, however, that this is not the whole story. First, since the peak year of 1984, the falloff in total enrolments has, in fact, been small. Compared to 1980, enrolments in 1988 were up more than 25 per cent, scarcely the result one would expect from a falloff in the just-out-of-secondary school age group. Second, despite some minor year-to-year variations in the applied arts, business, and health divisions, the long-term trend in enrolments in these divisions is positive. In contrast, enrolments in technology programs moved downward every year from 1983 to 1988. The total decline over this period was more than 8000, bringing enrolment in 1988 below its 1980 level.

Chart 15
College Full-Time Enrolments by Division
Ontario, 1980-1988



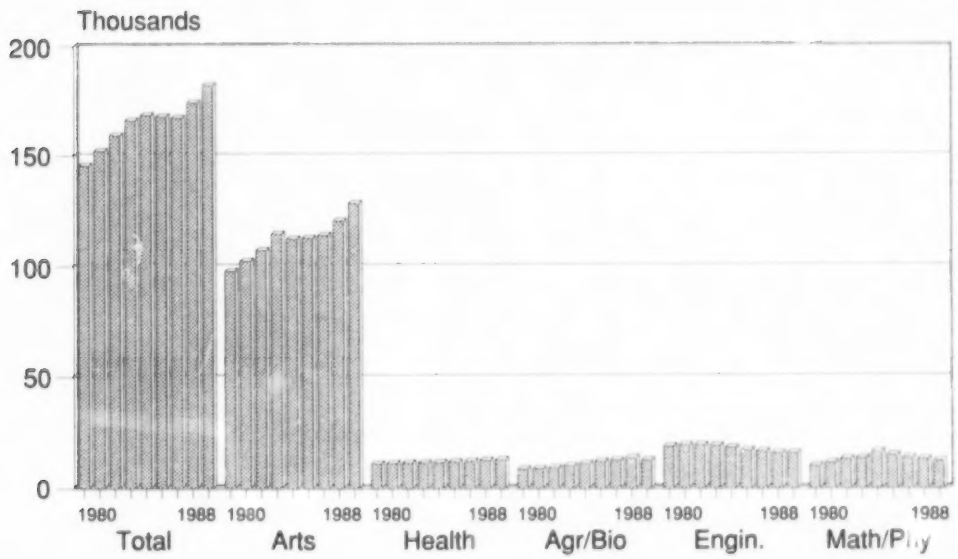
Source: Ministry of Colleges and Universities' Mid-Term Enrolment Survey.

Universities

Ontario universities are a key source of labour force entrants with advanced levels of education and training to meet the needs for individuals in a large variety of professional positions. A review of enrolments reveals patterns very similar to the ones depicted by the statistics for the community colleges.

Total university enrolments stabilized after 1983 and began to increase in 1987 (Chart 16); but differences appear between programs of study. Despite some year-to-year variations, the longer-term trend is for increasing enrolments in arts and science, education, humanities and social sciences, and the health professions. The same applies to the agricultural and biological sciences. The exception is enrolment in engineering and applied sciences and in mathematics programs. Enrolments in engineering began to decline after 1982, reflecting the impact of the 1981-1982 recession, and continued to fall through to 1987, and then increased slightly in 1988. Enrolments in computer science and mathematics have declined every year since 1984.

Chart 16
University Full-Time Enrolments
by Program, Ontario, 1980-1988

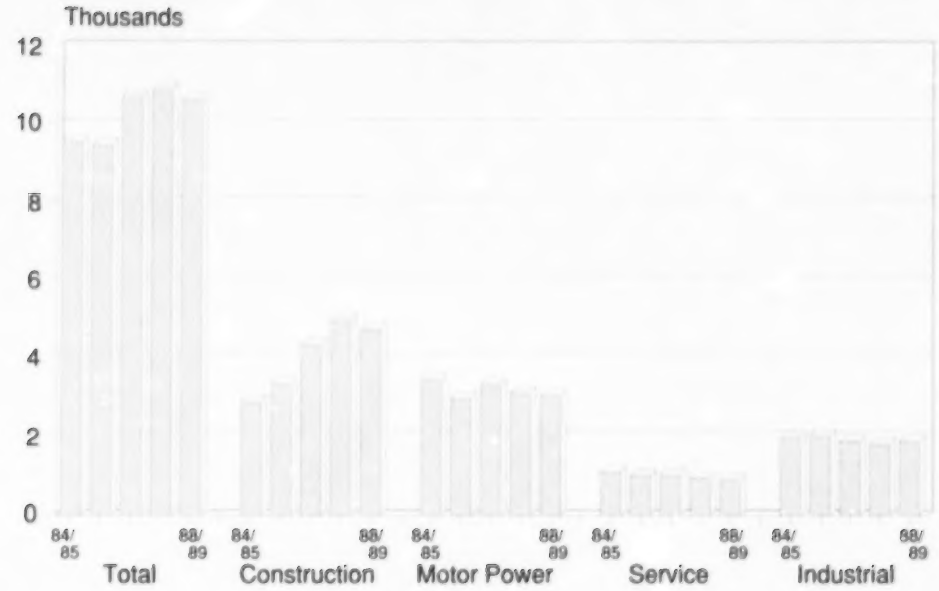


Note: Data include only bachelor's level enrolments.
Source: Based on data provided by the Ministry of Colleges and Universities.

Ontario's Apprenticeship Program

Ontario's formal apprenticeship training program is an important source of workers for many skilled trades. An examination of new apprentice registrations reveals little growth overall.[23] (Chart 17). Since fiscal year 1986-87, with the exception of construction trades, minor declines have occurred for each trade group, even though apprenticeship is an employer-driven program and Ontario recorded strong economic growth during this period.

Chart 17
Apprentice Registrations, Ontario
Fiscal years 1984-85 to 1988-89



Source: Apprenticeship Branch, Ministry of Skills Development.

The aggregate data for each trade group mask some interesting variations. Within the motor power trades, the number of persons entering the motor vehicle mechanic and automotive body repairer programs has fallen off. Behind the overall decline in registrations in industrial trades is a mixed pattern of fewer new registrations in the machinist, tool and die, and mould-maker training programs but increased registrations in the industrial mechanic-millwright and industrial electrician programs.

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[23]Because of changes in procedures in administering the apprentice program data, it is necessary to use fiscal year 1984-85 as the base year in reviewing apprenticeship registrations and completions.

The steady growth in construction trades registrations up to fiscal year 1987-1988 is based on a combination of economic and institutional factors. Not only has the industry expanded vigorously since 1984, there are also six construction trades that have compulsory certification – plumber, steamfitter, sheet metal workers, electrician, air conditioning and refrigeration workers, and hoisting engineer. In them, only people who either have a certificate of qualification or are registered as apprentices can work with the tools of the trade on the job site. Taken together, these six trades account for a large part of the increase in new registrations for construction trades apprenticeships. The decline in registrations in the service category is largely attributable to fewer persons entering the hairdresser, hairstylist, cook and baker programs.

Immigration

Immigration has been and will continue to be a key source of individuals to participate in building the Canadian economy. To what extent, however, can Canada and Ontario rely on immigration to resolve shortages of workers to fill higher-skilled jobs? One way to explore this question is to examine changes over time in several characteristics of immigrants who have come to Ontario: the languages in which they are proficient, their educational attainment levels, and the occupational categories in which they find jobs.

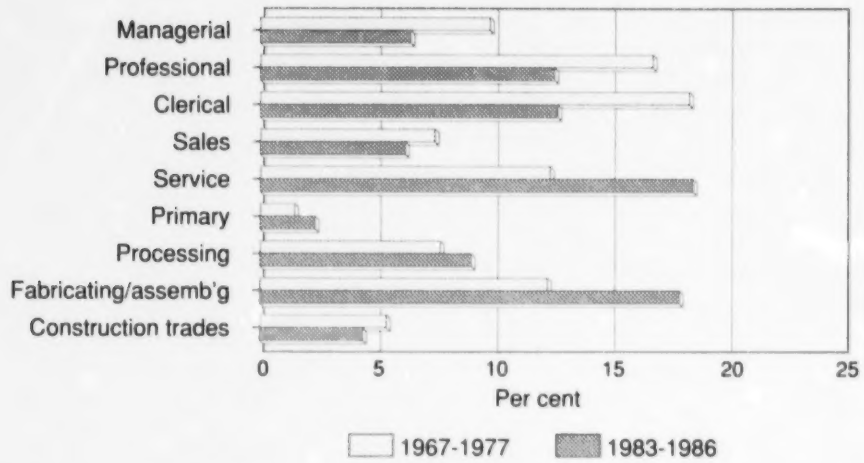
In the past two decades, there has been an increase in the proportion of immigrants entering Ontario who are not proficient in either English or French. By 1983-1986, the proportion in this category was 18 per cent up from 8.4 per cent in the previous ten year period.

With respect to changes over time in the education and training qualifications of immigrants, the available evidence is very mixed. A review of Statistics Canada's census data leads to the conclusion that their levels of education and training have declined. Information on the characteristics of landed immigrants from the Canada Employment and Immigration Commission, however, suggests the opposite.

If in fact the education and training qualifications have improved, the improvement has not translated into an increase in the ability of immigrants to take jobs in Ontario's economy in the managerial, professional and technical categories. As shown, in Chart 18, jobs for which immigration has become more important as a source of labour supply in recent years include those in service and in product processing, fabricating and assembling. For managerial, administrative, professional and technical occupations, immigration has become a less important source of supply than it used to be. The same applies in the construction trades.

In general, it appears that Canada's and Ontario's ability to exercise the immigration option to resolve shortages of workers for higher skilled jobs has become weaker. As economic conditions and standards of living have improved in other countries, Ontario has lost some of its attractiveness to well-qualified workers.

Chart 18
Distribution of Immigrant Labour Force
by Occupation, Ontario 1967-77 & 1983-86



Source: Based on Statistics Canada, Profile of the Immigrant Population, catalogue no. 93-155.

Potential Long-Term Shortages of Engineers, Technologists, and Technicians

From this review of sources of labour supply to meet requirements for professional and technical workers, one pattern that clearly stands out is of declining enrolments in college and university technology and engineering programs and little growth in apprentice registrations. This is a disturbing development that requires further comment.

The labour market for engineers, engineering technologists, and technicians and workers in the skilled trades became very unstable in the first part of the 1980s, a situation that probably contributed to the decline in enrolments in education and training programs in these areas at that time. What is alarming is the fact that enrolments have continued to move downward during the second half of the 1980s. Do these declines signal a shift in the preferences of young people in regard to the careers they wish to pursue – a shift away from careers in engineering and technical occupations towards careers in other areas of endeavour? If such a shift is indeed occurring, it will create problems in the long term because it comes at a time when technical and engineering jobs are becoming more important in the staffing patterns of many industries.

This potential problem is of particular concern in regard to the goods-producing industries, especially those that are in the traded-industries category. These are the industries that contribute most to the process of wealth creation and provide the basis for developing other components of the economy, improvements in society's standard of living, and the social infrastructure. Further, they are the ones most exposed to increased competition from offshore producers when protective tariffs decline. The

necessary adjustments – accelerating the introduction of measures to improve efficiency and product quality and to trade up to the production of more sophisticated, higher value-added products – can be made only if there are enough qualified engineers, technologists, and technicians available to manage and implement them.

It is well known that many parents and school counsellors have had a long standing bias against encouraging bright and capable young people to consider careers in the skilled trades.[24] The observed enrolment patterns in the colleges and universities suggest, however, that another bias may have crept into society. The term "postindustrial society" has come into the lexicon in recent years. Although the phrase is common and useful, it tends to mask and discount the important relationships and interdependancies between the goods-producing and service-producing sectors of the economy. Is it possible that the concept of the postindustrial society has been accepted so fully that those in positions to influence young people's choices view careers in technology and engineering jobs as no longer important or relevant?

This issue should be explored in greater depth. To do so would require an extensive analysis of both the vocational counselling system in Ontario and potential labour market imperfections. What are vocational counsellors saying (or not saying) to Ontario's young people? Are the information systems that have evolved in the labour market acting as positive or negative influences in attracting young people into technician, technologist, and engineering career paths? What kind of influence are earnings differentials having, and how do the recruitment and training practices of employers affect the market situation? Should the linkages between industries and the educational and training institutions be strengthened? Although not a comprehensive list, these questions are certainly some of the key points that need to be addressed.

Summary

This chapter has touched on many developments on the supply side of the labour market, all of which have implications for the ability of employers to recruit and hold the qualified workers they need and for the capacity of the economy to adjust and expand. Slowing labour force growth, an ageing work force and rising replacement needs, and the growing importance of women in the work force should signal, especially to those employers who have yet to do so, that reviews and adjustments of recruitment and human resource development and management policies are in order. Further, the decline in recent years in the number of individuals entering and graduating from engineering, technology, and skilled trades training programs means the shortage of these workers in the labour market is going to persist, a shortage that imposes a real constraint on the capacity of firms to make adjustments and of the economy to expand.

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[24]For a recent Ontario study on this subject see: John Walsh, Skilled Trades and Career Selection Research Project – A Summary, Research Report for the Kitchener, Waterloo and Guelph Training Advisory Council, Ontario, September 1988.

CHAPTER 6

Summary and Conclusions

Fundamental changes are underway in Ontario's labour market, changes that will continue throughout the next decade on both the demand and supply sides of the market. For employers and workers, the labour market environment will be a challenging one.

On the demand side of the market, jobs that have traditionally employed large numbers of semiskilled workers are becoming less important. The driving forces here are industrial restructuring, which has led to a decline in some goods-producing industries, and a new generation of technological innovations that are improving productivity and having profound effects on staffing patterns. Many of the jobs being affected involve the processing and machining of materials, clerical associated with well-defined repetitive tasks, and first-line supervision in both plants and offices. As positions for these kinds of work decline in importance in staffing patterns, more emphasis goes to those that involve higher level skills – professional and technical jobs in engineering and design, set-up, maintaining and repairing plant and machinery, and computer programming and related work in information processing and analysis.

To be sure, semiskilled jobs will continue to exist in the economy. Replacement needs will continue to generate job openings in processing, machining, and clerical work. Employment in these types of jobs will, however, become increasingly unstable as the pace of industrial restructuring and technological innovations in the work place continues unabated.

The service sector, which has become the Ontario economy's major contributor to job creation, will provide jobs at the lower end of the skills spectrum. But this sector will also provide a large number of new jobs for workers with managerial, professional, and technical skills, especially with substantial contributions to job creation in the 1990s being made by business services, communications, health services, and education.

On balance, the job mix will continue to shift in favour of knowledge workers. Many semiskilled jobs in the economy will become progressively less important.

On the supply side of the market, a dramatically new situation is evolving, one whose implications for employers will crystalize fully in the 1990s. With labour supply growth declining to about 1.5 per cent per year in the 1990s, a rate much lower than that of recent decades, the norm in the years ahead will be general labour shortage. The number of young people entering the labour market will not grow at all, and the work force will become older. Women's participation in the labour force will continue to rise during the 1990s and by the year 2000 their share of the work force will be close to one-half.

To deal with a general labour shortage situation and ensure they have the high-quality and adaptable work forces they require, many employers will have to re-examine their recruitment, human resource development and management policies and practices. They will have to assign higher priority to retaining and retraining workers whose jobs become redundant. Similarly, it will be important for firms to tap the energies and skills of women more effectively by providing them with opportunities to move into more challenging and higher level positions.

In addition, employers will find that recruiting workers to fill engineering, technologist and technician, and skilled trades jobs will be an increasingly tough proposition. Although the introduction of sophisticated production technologies is making these jobs increasingly important in staffing patterns, recent enrolments in engineering, technology, and apprenticeship programs signal a decline in the number of people coming into the labour market to fill the positions.

In an environment of general labour shortage, programs to assist displaced workers to find alternative employment will be essential. When workers become redundant because of industrial restructuring or technological innovations, providing them with opportunities to retrain and move to productive and rewarding jobs elsewhere will be necessary not only on the grounds of fairness or equity but also to circumvent labour shortages.

The evolving changes in the jobs mix have major implications for the types and levels of skills young people (and others) entering the labour force need to cope effectively with the world of work. Proficiency in basic mathematics, reading, writing, reasoning, and interpersonal skills will be requisites to do well in the labour market. Without adequate grounding in these basic skills, workers will find it increasingly difficult to learn more specific job-related tasks and to master new tasks when the content of jobs change.

Many of the jobs that are declining in importance today involve semiskilled or unskilled tasks that are tedious and repetitive in nature, require physical strength, or involve working conditions that are potentially hazardous to health and safety. The disappearance of such jobs and their replacement in staffing patterns by ones that require higher level skill sets creates opportunities for workers to move into better jobs. To make the transition, however, many workers will need to update some of their basic numeracy and communication skills. When production processes change today or work is reorganized, the ability to master tasks such as reading instruction manuals, taking measurements, using a computer keyboard to input information, and understanding statistical reports becomes important. With labour becoming a scarcer resource, employers will find it difficult to recruit new workers from outside who have the skills they require. Skills-upgrading programs to assist employees to master new assignments will take on greater importance.

Almost continuous skills upgrading will become a way of life for workers in many skilled jobs. Microelectronic– and computer-based innovations will diffuse further into workplaces and new generations of them will be developed and applied as firms continue to strive to become more efficient and to improve the quality of their products and services. Workers in diverse areas – design and engineering; installation, maintenance, and repair of machinery and equipment; fabrication; materials handling and planning; information processing and communications – will have to update their skills many times during their careers. Programs sponsored by employers or pursued by employees on their own initiative will be imperative.

APPENDIX A

Methodology for Occupational Employment Projections

This appendix provides a description of methodology used to project employment by occupation. For most occupations, the methodology involved two phases. The first was a forecast of employment by industry sector. This was accomplished by using the FOCUS-PRISM forecasting models developed by the Institute for Policy Analysis at the University of Toronto. The next phase involved developing a projection of employment by occupation across industry sectors. This was accomplished in two steps. First, occupational employment coefficients within industry sectors for the projection period were developed. These were then applied to the forecast industry employment levels to derive future estimates of employment growth by occupation.

Separate projections were prepared for occupations in education and in health care. Demand for teaching and related occupations is determined primarily by demographic trends along with institutional arrangements on matters such as student-teacher ratios. Similarly, employment growth in health care occupations is driven in large part by population dynamics (changes in the growth and age structure of the population) which impact heavily on the demand for health care services. Accordingly, with employment growth for occupations in education and health care not being directly dependent on economic growth patterns, separate projections for them were developed. Greater detail on these methodological aspects is provided below.

Industry Sector Total Employment Projections

Using the FOCUS-PRISM models, projections of industry sector employment to the year 2000 were prepared by the Institute for Policy Analysis. The FOCUS model, which is a quarterly forecasting and user simulation model of the Canadian economy, is composed of some 300 behavioral equations and identities. In addition, it contains about 180 exogenous variables. In generating the basecase projections, assumptions are specified for the exogenous variables. The model is simulated and the results are analysed for consistency. The exogenous variables and the behavioral relationships are modified until a reasonable set of results has been obtained.[25]

PRISM, which is a provincial-industrial satellite model, takes projection results of national aggregates from FOCUS and produces distributions for industrial production and employment at both the national and provincial levels. Real output produced by industry sector is determined by the projected final demands from FOCUS. The employment necessary to produce those levels of output is estimated through use of projected industry productivity measures and average hours per person for each industry sector. At the provincial level, industry sector employment depends on the

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[25]For a description of the model, see Institute for Policy Analysis, FOCUS: Forecasting and User Simulation Model of the Canadian Economy (Version 88B), University of Toronto, 1989.

provincial shares of national employment, adjusted for gross differences in provincial labour productivity.[26]

The FOCUS-PRISM basecase projections developed in June, 1989 by the Institute for Policy Analysis were made available to the Labour Market Research Group. Key assumptions about domestic and foreign economic environments were reviewed. In addition, the basecase projections on output and employment growth patterns by industry sector for Canada and Ontario were assessed in light of historical trend analysis. Expert professional assistance was provided by S. Tanny, Chief Economist of Woods Gordon, in reviewing the base case projections.

Minor revisions on key assumptions and industry sector output growth and productivity patterns were made and provided to the Institute for Policy Analysis for preparing revised projections to the year 2000.[27]

Projections of Occupational Employment

To project occupational employment growth, future shares of employment by occupation in each industry sector have to be estimated. The projected industry-occupational employment coefficients are then multiplied by projected industry sector total employment and the results are aggregated across all industry sectors to yield total employment by occupation. Through this model, the occupational employment projections are determined by changes in industry employment growth patterns as well as changes in occupational distributions within industry sectors which reflect changes in firms staffing patterns.[28]

In projecting the industry-occupational employment coefficients matrix the first step was to identify occupations that have experienced significant shifts in employment coefficients. These shifts in occupational employment coefficients were then analysed in more detail sector by sector for the period 1971 to 1986 and for two sub-periods, 1971 to 1981 and 1981 to 1986. Historical trends and projections of future occupational trends for the Canadian economy and for the United States economy[29] were also

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[26]For a more detailed description of the model and the basecase projection, see Institute or Policy Analysis, PRISM: Provincial-Industrial Model of the Canadian Economy (Version 82A), University of Toronto, 1982, and Arthur Younger, PRISM Projection: Industries and Provinces, 1989-2013, PEAP Policy Study 89-6, Institute for Policy Analysis, University of Toronto, 1989.

[27]For those readers interested in examining these assumptions in more detail see P. Dungan, D. Fujimagari and T. Wilson, National Projection Through 2013, PEAP Policy Study 89-1, January 1989 and PEAP MEMO 89-3, Revised FOCUS Projection Through 2013, June 1989.

[28]Firms' staffing patterns can be represented by the industry-occupational employment coefficients matrix which shows the proportion of workers in an industry sector that work in each occupation.

[29]See U.S. Bureau of Labour Statistics, Projections 2000, Bulletin 2302, Part III, March 1988.

analysed and compared with Ontario's experience. Based on these analysis, estimates on the annual rate of change in occupational employment coefficients by industry sector to the year 2000 were developed.

To identify occupations with significant shifts in employment coefficients, Statistics Canada's Census data on employment by detailed industry and occupation (based on the 1970 Standard Industrial Classification and 1971 Occupational Classification Manual) for 1971, 1981 and 1986 were used.

Net change in employment in each four-digit occupation for the 1971-1981 and the 1981-1986 periods was statistically decomposed into three components: (1) that due to growth in industry employment, (2) that due to shifts in employment coefficients within industries, and (3) an interaction term due to changes in both factors.[30] Occupations affected most by shifts in employment coefficients within industries were identified based on the following criteria: (1) change in employment due to shift in employment coefficients accounts for more than half of the total net change in employment, (2) the direction of the shifts in employment coefficients is consistent in both time periods, (3) if the net impact of the shifts in employment coefficients has altered between the two time periods, analysis was undertaken to assess whether the recent shifts in coefficients reflected technological changes introduced in the 1980s. To be eligible for this analysis the number of persons employed in an occupation had to be more than 700.

In order to be compatible with Statistics Canada's Labour Force Survey data from which industry sector employment projections are based, military occupations (e.g., Armed Force commissioned officers and other ranks) are excluded from the data. Also excluded from the analysis is the residual industry category (e.g., industries not elsewhere classified). Although Census occupational employment data are available by three-digit industry, at the detailed industry level, many occupations show no estimates of employment. Also, projections of industry sector total employment from the FOCUS-PRISM models are available only at a broader industry sector level. Therefore, for the purposes of historical trend analysis, Census occupational employment data were aggregated into 47 industry sectors to be consistent with the PRISM industry sector groupings.

Based on the analyses undertaken, judgments were made as to whether factors underlying the shifts in occupational employment coefficients in the past would likely to continue. An annual average rate of change in employment coefficients was projected to the year 2000 for each industry sector. The projected rates of change in employment

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[30]The net change in the number of persons employed in occupation i between 1971 and 1981 ($\triangle E_i$) can be statistically decomposed as:

$$\triangle E_i = \Sigma A_{ij71} * \triangle E_{ij} + \Sigma \triangle A_{ij} * E_{.j71} + \Sigma \triangle A_{ij} * \triangle A_{.j}$$

where A_{ij71} is an occupational coefficients matrix in 1971 which shows the share of persons employed in occupation i and industry j to total employment in industry j;

$E_{.j71}$ denote total employment in industry j in 1971; and

$\triangle$ denote the change 1971 and 1981.

coefficients by industry sector were applied to the base year (1986) industry-occupation matrix to yield a projected matrix for the year 2000.[31]

For occupations where it was assumed that coefficients would remain unchanged, this implies: (1) that employment growth in these occupations are determined primarily by industry growth patterns, or (2) that the direction of the shifts in employment coefficients over the past 15 years is not conclusive such that no change in occupational employment coefficients within industry is projected.

Occupational Projections for Health Care Sector

In projecting occupational employment growth for the health care service sector, professional assistance was provided by Professors F. Denton and B. Spencer of McMaster University. Projections of employment in occupations within the health care service sector as well as the total sector work force were extrapolated based on the historical relationship between changes in health care employment and changes in the health care requirements index[32] of the Ontario population.

The data for the projections were based on Statistics Canada Censuses of 1971, 1981 and 1986. The results of the occupational projections for the health care sector were integrated with the other projections in estimating future occupational employment growth.

Occupational Employment Projections for Education Sector

In projecting employment growth for the education sector, professional assistance was provided by Professors M. Skolnik and S. Quazi of the Ontario Institute for Studies in Education. Projections of employment for the education sector, in total and for selected teaching and related occupational groups to the year 2000 were prepared.

These projections are developed on the basis of historical trend analysis of students-teacher ratios and extrapolation of these ratios to projected student enrolments to estimate demand for teachers in each education sub-sector. Projections of enrolment for elementary and secondary schools are taken from a study by the

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[31]The base year industry-occupation coefficient matrix is derived from the 1986 Census data on the basis of the 1980 Standard Industrial Classification and the 1981 Standard Occupational Classification. However, projections of the shifts in occupational employment coefficients are made based on the data of the 1970 SIC and 1971 OCM. Attempts were then made to see the possible impact of changing SIC definitions on the employment estimates for the 47 industry sector groupings. It was found that regrouping of industries from the 1970 SIC to the 1980 SIC only cause a very small portion of some three-digit industries crossing the industry sector boundary. No adjustments can be made to the data because of the lack of relevant employment data at this level of detail.

[32]The health care requirements index measures the levels of health care requirements for men and women of different ages by taking into account changes in population size and changes in age-sex composition of the population.

Canadian Teachers' Federation[33], the projections for the Colleges of Applied Arts and Technology were obtained from the Ministry of Colleges and Universities[34]. Enrolment projections for the University system were made based on medium population growth projection provided by Ministry of Treasury and Economics and extrapolations of age-sex school participation rates.

Projections of employment in non-teaching categories were made based on an extrapolations of historical trends in the ratios between employment in each of these occupational categories and the number of teachers employed.

Since these projections were made based primarily on data collected from institutions or school boards, they are not necessarily in line with estimates shown in the Census data. In order to provide consistent estimates with all other occupations, the projected growth rate derived from the institutional data were applied to the base year Census occupational employment data to yield projections of occupational employment growth for the education sector.

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[33]Canadian Teachers' Federation, Projections of Elementary and Secondary Enrolment and the Teaching Force in Canada, 1987-88 to 2006-07, Ottawa, 1989.

[34]Ministry of Colleges and Universities, "Enrolment in Colleges of Applied Arts and Technology", Toronto, 1989.

APPENDIX B

Methodology to Estimate Replacement Needs

The methods used to calculate estimates of replacement needs attributable to age-related labour force withdrawals and to deaths are described in this appendix. The calculations were made for occupations at the 4-digit level in the 1981 Standard Occupational Classification. Base year data on labour force by occupation were obtained from the 1986 Quinquennial Census.

To calculate age-related withdrawals over the projection period, 1986-1988 average labour force participation rates by single-years of age and sex from the Labour Force Survey are used to derive labour force withdrawal rates.[35] Withdrawals of workers from occupations were estimated by applying the labour force withdrawal rates to single-year age cohorts within each 4-digit occupational group and then ageing the labour force in the occupations over the projection period. As part of the calculation, it is assumed that persons who reach age 70 during the projection period retire from the labour force.

In regards to replacement needs arising from deaths, these were estimated for each 4-digit occupation by ageing the labour force over the projection period and applying age-sex specific mortality rates of the Ontario population as of 1985-87.

Replacement needs are the accumulated total of withdrawals attributable to retirements plus deaths estimated over the 1990-2000 projection period. These estimates of replacement needs, of course, understate total replacements requirements since they are estimated based on the 1986 stock and they do not take into account those that arise from inter-occupational mobility.

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[35]These labour force withdrawal rates for each age-sex group (LFWR) were estimated as follows:

$$LFWR(a) = 1 - LFPR(a + 1)/LFPR(a)$$

where LFPR is the labour force participation rate and a is the age cohort from 50 to 69.